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Remington Rand Inc., Dept. 152-12, Buffalo, N. Y.

Please tell me how I can buy a new Remington Portable typewriter

This One

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• • •

"The fact that the responsibility for such a large part of the entire telephone service of the country rests solely upon this Company and its Associated Companies also imposes on the management an unusual obligation to the public to see to it that the service shall at all times be adequate, dependable and satisfactory to the user. Obviously, the only sound policy that will meet these obligations is to continue to furnish the best possible telephone service at the lowest cost consistent with financial safety. This policy is bound to succeed in the long run and there is no justification for acting otherwise than for the long run. . . .

"Earnings must be sufficient to assure the best possible telephone service at all times and to assure the continued financial integrity of the business. Earnings that are less than adequate must result in telephone service that is something less than the best possible. . . . The margin of safety in earnings is only a small percentage of the rate charged for service, but that we may carry out our ideals and aims it is essential that this margin be kept adequate. . . . This is fundamental in the policy of the management."

Quoted paragraphs are from an address by Walter S. Gifford, president of the American Telephone and Telegraph Company, at Dallas, October 20, 1927.

BELL TELEPHONE SYSTEM

Popular Mechanics Magazine

H. H. WINDSOR, Founder — H. H. WINDSOR, Jr., Editor and Publisher

December, 1934 — Vol. 62, No. 6

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Are You a New Era Driver?

WHEN you trade in that old bus and step into a shiny new automobile, you will need to learn some new driving tricks and discard some of the old ones. An ability to operate a worn, antiquated car efficiently is no guarantee that the same driver can get the most out of a modern car. An entirely new kind of "touch" is necessary for today's automobile with its knee-action, synchro-mesh transmission, more efficient brakes and other improvements. An article in the January issue explains the modern driving practices which will enable you to get the most out of the operating aids incorporated in modern cars.

Next Month

HAVE you ever wondered how the man in the movies tossed a rope into the air and then climbed it hand over hand? The second part of "Movie Magic in the Making" explains this trick and many others. And eight pages of pictures in color show how thrilling "trick" shots are made.

Uncle Sam's Dams

UNCLE SAM today is the world's greatest builder of dams. He is spending almost $1,000,000,000 on nine vast hydro-electric projects. Boulder dam alone will be able to store the entire flow of the Colorado river for two years. What will all this added water power mean to the nation and what other benefits besides increased power may be expected from these great dams? An article in the January issue explains the government's program and pictures and drawings show the magnitude of these great projects.

New Puzzle Wanted

AN absolutely new puzzle is one of the rarest things in nature and will bring more people to the inventor's door than any mouse trap ever conceived. There is money in puzzle inventing and this has become the part time job of thousands. An article next month tells you what constitutes a successful puzzle and how to go about inventing one.

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Last year thousands of people paid

SEEMS queer that people would pay hard-earned cash for plain ordinary water. But last Winter quite a lot of people did just that. Naturally, they didn't realize it. They thought they were buying anti-freeze. And so they were . . . but not concentrated, undiluted anti-freeze. They were buying anti-freeze diluted with water.

How much water? Well . . . the amount of water in a diluted anti-freeze may run as high as 60%. Thousands of gallons of diluted anti-freeze were sold last year with a water content as high as 40%. The car owner who paid for a gallon of such a product actually received 6/10 of a gallon of anti-freeze—4/10 of a gallon of plain water.

Water is cheap . . . If Eveready Prestone were sold as a diluted instead of a concentrated anti-freeze, the price could be reduced enormously. But naturally, for protection against "Freeze-up" you would need to use a lot more.

All-Winter Protection So Inexpensive

In buying a concentrated, undiluted product like Eveready Prestone you know what you get for your money. It is all anti-freeze. Furthermore, you don't pay the canning and shipping costs on water.

Don't risk this Winter without Eveready Prestone protection for your car. Turn to the guarantee on page 14A, and see on the chart how inexpensively your car can have Eveready Prestone's all-Winter protection.

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"With the passage of the National Industrial Recovery Act, there will be placed before all branches of the accounting profession greatly increased opportunities and responsibilities."

Editorial Note June 15, 1933 Bulletin of the National Association of Cost Accountants

The *New* OPPORTUNITY in ACCOUNTING

—and how you can take advantage of it

NEVER before, has there been as great an opportunity as now faces efficient bookkeepers and accountants.

You know, of course, that accounting has always been a profession of outstanding opportunity—a field in which the capable, trained man could go faster and farther than in almost any other field. But we believe that all past opportunities are going to be surpassed in the next five years.

And here's why:

In the first place, every firm will watch its accounting as never before. This depression has taught executives the vital necessity of knowing all the facts about their business, where their company stands all the time.

Then our new governmental policy—controlled economy—forces the keeping of better and more complete records in every office and plant. It will not be a matter of choice with any firm—it will be necessity.

For instance, the National Industrial Recovery Act, with regulation of production, minimum wages, uniform prices, codes of practices—centers around cost control and uniform accounting within each industry.

The new Federal Securities Act, with its insistence upon publicity of *complete* facts about every company selling its securities publicly, will compel more frequent and more accurate financial statements—and these in turn call for more and better accounting.

And as business gains momentum, there will be a greater demand for trained bookkeepers and accountants—they will go back to work sooner and in larger proportion than any other group—in fact, accountants tell us the demand will probably soon exceed the supply.

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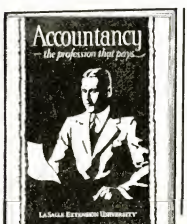

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That night, however, I was attracted by a most interesting item which told about a little book called "Mistakes Commonly Made In Selling." It also told of a most unusual training for salesmen, given by a group of leading sales execs.
I found that that little book was free, and I sent for it, to see what it could tell me.
It was amazingly interesting. What made it most interesting to me, however, was that it accurately described the selling tactics of several fellows I had been working with. It showed why they were losing so many sales.
When I arrived at the office next day I said I was going out alone, and I went and called back at every office where we had been before. But I had noted the mistakes listed in that book and I took care to avoid them—especially the ones which I knew the other men had made.
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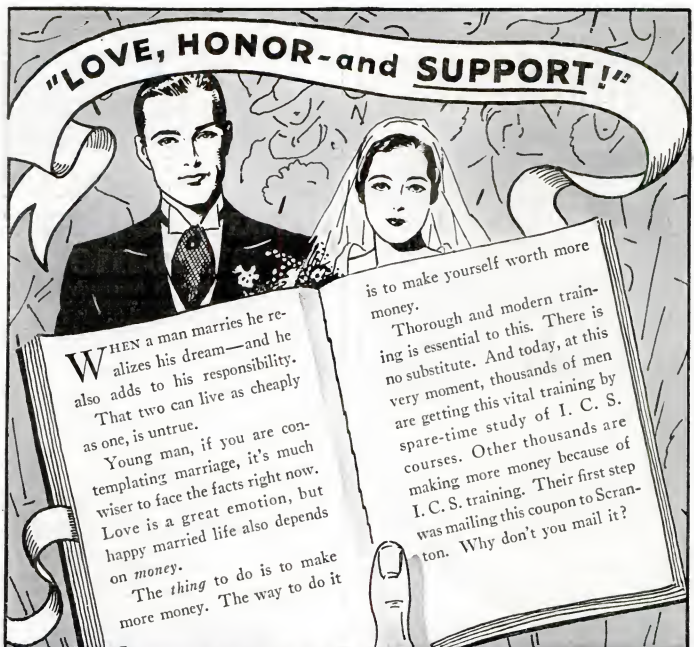

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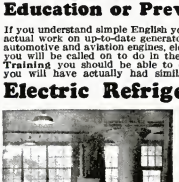

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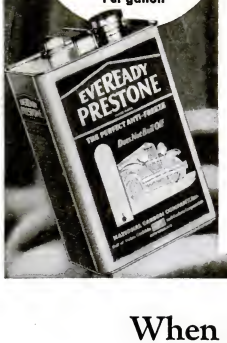

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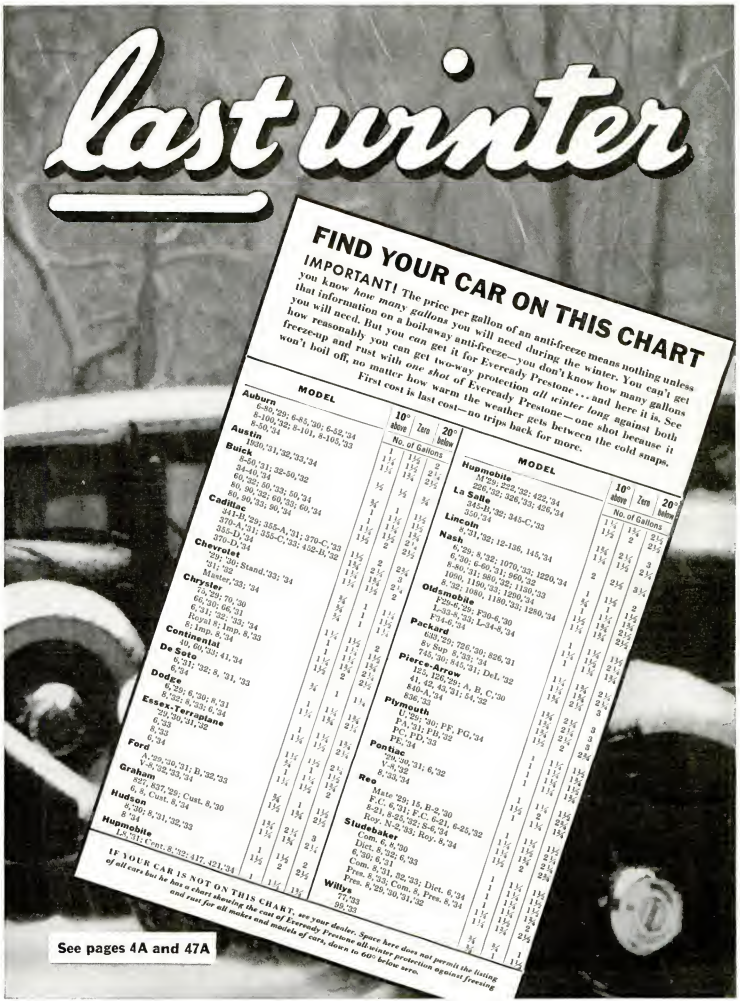
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6, '31; '32; 8, '31, '33
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6, '29; 6, '30; 8, '31
6, '32; 8, '32; 6, '34
Essex-Terraplane
Super-Six, '30; '31; '32
6, '33
6, '34
Ford
A, '28-'29, '31; B, '32, '33
V-8, '32, '33, '34
Graham
827, '29; Cust. 8, '30
6, 8, Cust. 6, '34
Hudson
6, '30; 8, '31, '32, '33
8, '34
Hupmobile
'31; Cust. 8, '32; 417, 421, '34
IF YOUR CAR IS NOT ON THIS CHART, see your dealer. Space here does not permit the listing of all cars but he has a chart showing the cost of Eveready Prestone all-winter protection against freezing and rust for all makes and models of cars, down to 60° below zero.
MODEL
10° above
Zero
20° below
No. of Gallons
Hupmobile
M '29; 225, '32; 422, '34
La Salle
345-B, '32; 345-C, '33
350, '34
Lincoln
'31, '32; 12-136, 145, '34
Nash
8, '29; 8, '32; 1070, '33; 1220, '34
6, '30; 6-60, '31; 1200, '32
8-80, '31; 880, '32; 1200, '33
1000, '31; 980, '32; 1250, '33
1000, 1196, '32; 1250, '33
1000, 1080, '33; 1200, '34
Oldsmobile
L-30, '29; 1160, '31; 1280, '34
L-32, '29; 1280, '30
L-33, '29; L-34-8, '34
Packard
626, '29; 726, '30; 826, '31
8, Sup. 8, '32; '34
745, '30; 845, '31; Del. '32
Pierce-Arrow
125, '29; A, B, C, '30
41, 42, '30, '31; A, B, C, '30
840-A, '31, '34, '32
836, '33
Plymouth
U, '29, '30; FF, FG, '34
FA, '31; FB, '32
FC, FD, '33
FE, '34
Pontiac
'29, '30; '31; 6, '32
8, '32
6, '33, '34
Reo
Mate '28; 15, B-2, '30
F-C, 6, '31; F-C, 6-21, '32
F-C, 8-25, '32; F-C, 6-21, 6-25, '32
Roy. N-C, '33; Roy. 8, '34
Royale N-C, '33; Roy. 6, '34
Studebaker
6, 8, '30
Dict. 6, '32, 6, '33
6, '30; 6, '32, 6, '33
Com. 8, '31, 32, '33, Dict. 6, '34
Pres. 8, '31; Com. 8, Pres. 8, '34
Willys
'27, '33
90, '33
See pages 4A and 47A

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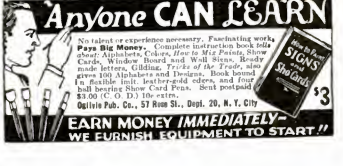

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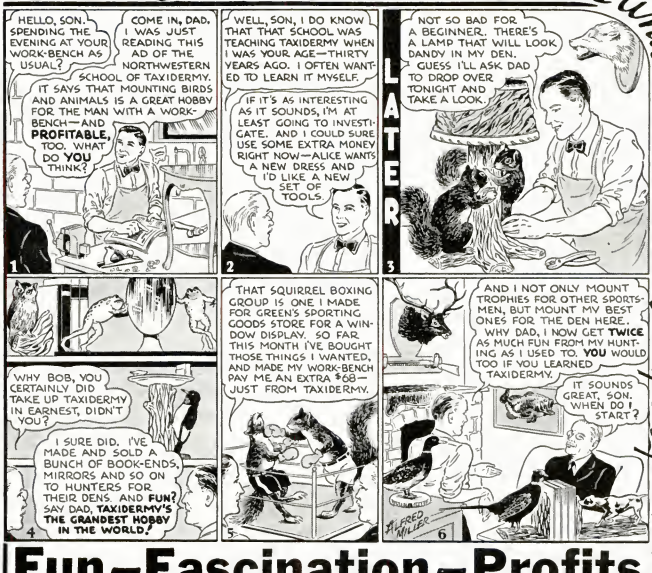

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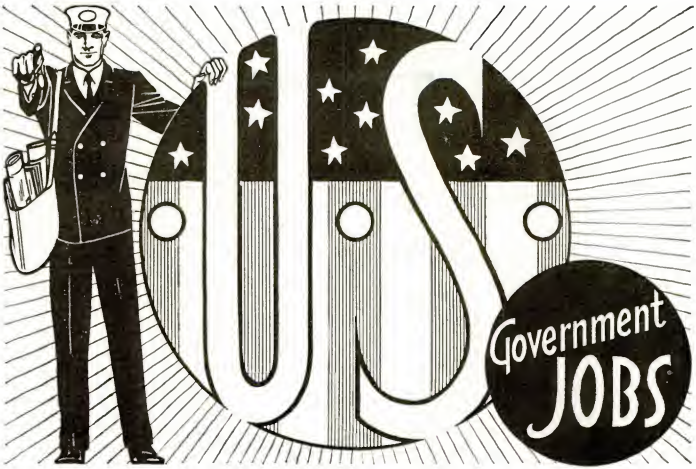

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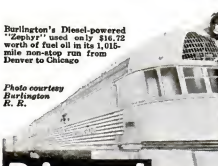

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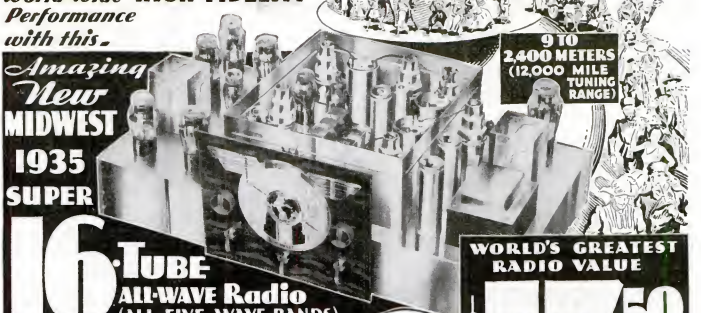

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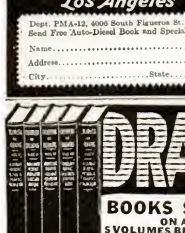

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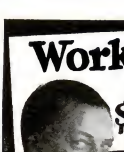

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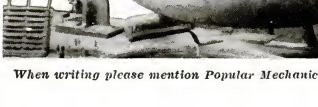

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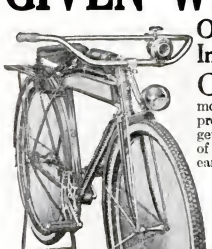

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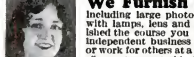

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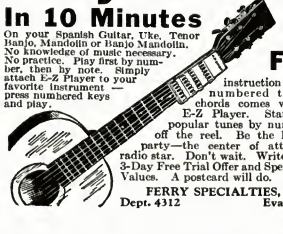

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100% PROFIT In the mystery clear lighter. No flint or friction. What makes it light? Sample can lower it out. Retails 25c. Sample and sales plan 25c. New Method Company, Desk PM-24, New Method Bldg., Bradford, Pa.

BRAND New invention. Auto brush. Attaches to garden hose. Washes entire car, spokes and all. 100% profit. Exclusive territory to distributors. Sample $1.50. Circular free. Inviser Auto Brush Co., 411 E. Fort, Detroit, Mich.

MIRACLE Inhaler for colds, asthma, headaches, sinus, hay fever. Quick easy seller, moneymaker. Homes, offices, stores, factories. Sample, details 25c. Holford Company, Minneapolis, Minn.

$2.00 HOURLY With new, scientific cream that mends all cloth easily, quickly, invisibly, without needle and thread. Stands laundering. Free sample. Sew-No-More Co., Dept. D-744, Cincinnati, O.

NEW Line, 300 fast selling needed goods, novelties, necessities, incense, blades. Samples, catalog 10c. Easternclty Sales, 8-ES Randolph, Chicago.

RAINCOATS, Jackets: Latest numbers. Lowest prices. Union made. Selling fast. Commissions advanced. Experience unnecessary. Outfit free. Royal, M-724 Roosevelt, Chicago.

MARRIED Man with spare time to distribute free samples coffee, flavoring, food products and make customers. Must devote at least two hours daily and be satisfied with up to $3 in an hour. Permanent. Blair, Dept. DFS 8, Lynchburg, Va.

GENUINE Mexican opals. Perfectly cut. Edomao, Apartado 762, Mexico, City.

SALES Kit free. Write for our free offer and catalog of household deals, cosmetics, extracts, etc. Make money selling your friends and neighbors. Clyde Collins Chemical Co., Dept. PM-11, Memphis, Tenn.

DISTRIBUTORS: Represent manufacturer. Sell Latex—self sealing bandage that breathes. Great demonstrator. Lowest prices. 400% profit. Good repeater. Exclusive territory. Neway, 24-H South Clinton, Chicago.

LIFETIME Opportunity. Surplus world's fair jewelry and novelties. Complete selections $2.00. Sells $10.00. Kahn Associates, Whitley Bldg., Chicago.

OUTSTANDING Seller, Sobrite metal polishing cloth. Steady repeater. Sample free. Peer, 32 Union Square, New York.

SELL Stores supplying Christmas signs. First day's sales will amaze you. Glitterite Sign Co., 120 Market St., St. Louis, Mo.

SELL Stores' friends multicolored copyrighted magic book. Christmas sales. 25c. Jaffre, 254 West 31st, New York.

AGENTS—Make big money. Sell key tags. Send 25c coin for sample. Stephen Hollister, Cascade, Wis.

AGENTS—Indians. Quick sales—Big profits. Write for proposition. Bernard's, Union Trust Bldg., Sioux Falls, So. Dak.

MEXICAN Feather pictures. Christmas novelty. Send 25c (stamps) for $1.00 worth sample and details. Mexican Art, Apartado 1593, Mexico City.

$2.00 HOURLY With amazing invention. Old shoes made like new in five minutes. 6c pair; no skill. Obtain or dye. Sample. Sat-An-Upper, Dept. D-227, Cincinnati, O.

1000 BEST Sellers, blades 65c hundred, needle books 25c dozen. Free wholesale catalogue. Paty Company, 74 Elston, Somerville, Mass.

MAKE Big money; commissions advanced; sell raincoats, slipperjackets, union made; latest style, quality; lowest prices, experience unnecessary; outfit free. Goodyear, A-712 Roosevelt, Chicago.

TERRITORY Available. Ringanvile seal stops oil-pumping, increases compression. One Dollar per tube. Grawall Company, No. Tonawanda, N. Y.

ANYFREEZE Radiator compound. Greatest winter seller. Cheaper, better than alcohol. Whirlwind seller to garages. Particulars. Big profits. St. Paul, Minn.

"PREVENTS-RUNS". Prevents silk hose from running. 350% profit. Specialty Mfg., 127 South Broadway, Los Angeles, Calif.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish formulas. Valuable book free. National Scientific Laboratories, 1936W Broad, Richmond, Va.

AGENTS—Sell the glasses California orange jelly, 25c. 200% profit. 5 glass sample 25c. Cutter-Clarke, 5515-M Ruthelen, Los Angeles, Calif.

JUST What you're looking for—a business of your own handling the slickest line of quick sellers you ever saw. Every one a winner. Take your pick or handle them all. Sell stores, homes, offices. Liberal commissions. Be in all sections. Investigate. C. H. Hadlock, Dept. 1311, 1837 N. Ogden, Chicago.

SELLS Like hot cakes. Big profits. New laundry soapflakes. Perfumes clothes lastingly, when washing. Territory given. Sunset Laboratories, Dept. 5, N. Y.

AMAZING Corn remover. Big profits for distributors. Write Possco, 760 Milwaukee, Chicago.

MAKE Big money! Commissions advanced. Sell raincoats and zipper jackets. Latest style and quality. Lowest prices. Experience unnecessary. Outfit free. Goodyear, AJ-712 Roosevelt, Chicago.

CASH Income daily resilvering mirrors at home. Resilvering outsparts, tableware, etc. Portable outfit. Write Sprinkle, Plater, 128, Marion, Ind.

STRANGE Ironing cord. Prevents scorching. Saves electricity. Abolishes kinks, snarls. Approved by Good Housekeeping. For telephone cords, 140% profit. Samples furnished. Neverknot, Dept. 12-A, 4503 Ravenswood, Chicago.

500% PROFIT Selling new "20-in-1" kitchen set. Costs you $1.00 a dozen. Sample 10c. New Method Co., PMM-24, Bradford, Pa.

100 BLADES 50c. Shaving cream 4½c. List 200 items free. Mayo, Richmond, Va.

FOR the holidays—our Luminous Crucifix which "shines in the dark" is the most appropriate gift of all. An instant to demonstrate and the sale is made. Big profits. Hannan Co., 2539 South State, Chicago.

PORTRAIT Agents—Lowest prices, portraits, frames. Catalogue free. Picture Man Friedman, 528 Cornelia, Dept. 9, Chicago, Illinois.

SELL Wonderful trouser stretcher, creaser, hanger $1.00. Agents 60c. Widness, 1461 Fulton St., Brooklyn, N. Y.

Copyrighted material

DOUBLE-EYED Self-threading needle packages, size 3/9. Hints paste thread them. Invaluable for failing sight, necessary for good sight. Sample particulars 10c. Agents wanted. Wm. Oglesby, Vandalia, Ill.

AMAZINGLY Simple spare-time business. Big profits. No risk. Your home is your office. If you want to make real money, here's your chance. Full details free—write quick. Albert Mills, 4674 Monmouth, Cincinnati, O.

BEAUTIFUL Foil window letters. Large assorted. Penny each. Popular sizes. Easily applied. Samples, complete working equipment free. Note our ad page 148A. Atlas Sign Works, 7941 Halsted, Chicago.

TWENTY Dollars a day easily made with Quixo, the magic wiper and polisher and permanent beauty treatment for automobiles and furniture. No rubbing, no polishing. Free sample and details. General Paint & Chemical Co., Cincinnati, Ohio.

FROST-OFF. Marvelous chemical cloth attached to winder, keeps windshield clear. Sells 35c. Whirlwind seller to garages. Particulars free or enclose 25c for sample. Frost-Off Co., St. Paul, Minn.

AGENTS! We'll pay your bills, steady income for life handling our business in your locality. New territories now being assigned for America's fastest selling line. Experience unnecessary. Reseats sure. Details free! Colby Laboratories, 201, Newton, Massachusetts.

PROFIT With new products. Make, sell, repeat. Guaranteed formulas. Special prices, leads. Biggest catalog free. Gibson, Chemist, BD-4702 North Racine, Chicago.

GENUINE Gold letters for stores, windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 428-B North Clark, Chicago.

NEW Silver tinseled Christmas signs, 9"x12", cost 2½c, retails 25c, sample free, clean up this Christmas! Lowy, 8 West Broadway, New York.

SENSATIONAL New 15c scissor sharpener proves amazing seller. Write Mike Kane for sample, details 10c. Dandee Company, 14 North Sixth Street, Minneapolis, Minn.

AGENTS: Smash go prices! Santos coffee 12c lb. 4-oz. vanilla 8½c. $1.00 size tonic 14c. Razor blades, 10 for 8½c. 100 sticks chewing gum 25c. Christmas package, $1 box, 14c. 150 other bargains. Experience unnecessary. Write Carnation Co., PO, St. Louis, Missouri.

SELL "Lucky Seven" Christmas packages! 25c seller—20c profit! Big flash! Particulars free. Three packages 25c. Elfco, 523 South Dearborn, Chicago.

MAKE Products yourself. Formulas catalog free. Scientico, 45-C, Patchin Pl., Chi.

REGULAR Income; home, office, no canvassing. McArthur Co., Desk 5, Butte, Mont.

MAKE 200% money selling shirts, ties, underwear, dresses, hosiery, raincoats, sweaters, coveralls, pants, uniforms. Outfit free! Nimrod Company, Department 8, 4922-28 Lincoln Avenue, Chicago.

NEW $30.00 Value radio given in "free deal." Earn up to $100.00 weekly. New sales plan. Also auto radios. Meritone Mfg. Co., 3837 North Hamilton, Chicago.

FREE Literature describing many money making plans. Belfort, 4042 N. Keeler, Chicago.

SUCCEED With your products. Learn how. Formulas. Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

OPERATE Home mail order business; selling our products. Everything furnished. Superior Specialties, Bridgeport, Conn.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples. "Raico," 1084 Washington, Boston, Mass.

MAN In each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, candlesticks; by new method; no capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge $1.50; make $1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 40, East Orange, N. J.

AGENTS—Opportunity to make money; book containing 87 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

AMAZING Cleaner. Cleans everything. Sample free. Bestever, 5067P Irving Park, Chicago.

A BUSINESS Of your own making sparkling glass name plates, numbers, checkerboards, medallions, signs. Booklet and sample mailed free. E. Palmer, 512, Wooster, Ohio.

PROFITABLE Home business. Legitimate. No canvassing. Maywood Publishers, P-923 Broadway, New York.

OUTSTANDING Easy selling products. No competition. Sample 10c. Mint Co., Baroda, Mich.

SELL Made to measure raincoats. Outfit free. Goodyear Rainwear, 18 West 22nd, New York.

BE Independent. Own your business; experience unnecessary, selling $10,000 accidental death, $30 accident; $25 sick weekly benefits—$10.00 yearly. Other amounts proportionate. Guaranteed steady renewal income. $250,000 deposited insurance department. Universal Policy, 716-A Lefcourt Bldg., Newark, N. J.

HIGH-GRADE SALESMEN WANTED

YEAR'S Income in 3 months! New federal, state and code laws create immense demand for simplified record system every business man must have to protect himself against fines and penalties. Millions users must buy again now. Our men selling 5 to 25 daily our office-posted, copyrighted Liberty Tax Record. $3.50 cash profit every sale. Repeat commissions without callbacks. Live leads furnished. Big season now. Choice territories going fast. Commonwealth Publishing Company, 508 So. Dearborn, Chicago.

SELL Stores new, sensational counter cards. Special sale, cut prices at 3c. Seven aspirin tablets 5c. Sell 25c size. Up to 177% profit for you and merchant. Razor blades, laxative gum, comb, etc., and many other exclusive, big selling items. No investment to start. Protected territories. Columbus Discovery Products, Dept. FC-35, Columbus, Ohio.

MEN Wanted by world-wide industry—Apply by letter only, giving age, experience, references. Industry and reliability main qualifications. Man selected will become authorized Rawleigh dealer, and supplied and taught how to establish a profitable business in over 250 farm and home necessities. Man with auto to call on farmers. Products and travel steadily. Write immediately. Rawleigh, Dept. L-N-PPM, Freeport, Ill.

GO Into wholesale business without investment. Call on stores with biggest line selling counter displays: Aspirin, razor blades, lipstick, perchelle, toothpaste, household cement, 79 different items. Up to 125% profit for you. Experience unnecessary. Write for catalog and plans. Procopax, Dept. 26-DD, 1956 S. Troy, Chicago.

NEW Gluten bread reducer increases 3 ways at once. Revolutionary invention. Saves cleaning bills. Homes, offices buy instantly. Phenomenal repeater. Outfit free. Kristee Mfg., Box 1442, Akron, Ohio.

SHOPOSCOPE Sells on sight. 200% profit. Free sample. Experience unnecessary. Write for catalog and plans. Procopax, Dept. 26-DD, 1956 S. Troy, Chicago.

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FREE Literature describing many money making plans. Belfort, 4042 N. Keeler, Chicago.

SUCCEED With your products. Learn how. Formulas. Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

OPERATE Home mail order business; selling our products. Everything furnished. Superior Specialties, Bridgeport, Conn.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples. "Raico," 1084 Washington, Boston, Mass.

MAN In each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, candlesticks; by new method; no capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge $1.50; make $1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 40, East Orange, N. J.

AGENTS—Opportunity to make money; book containing 87 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

AMAZING Cleaner. Cleans everything. Sample free. Bestever, 5067P Irving Park, Chicago.

A BUSINESS Of your own making sparkling glass name plates, numbers, checkerboards, medallions, signs. Booklet and sample mailed free. E. Palmer, 512, Wooster, Ohio.

PROFITABLE Home business. Legitimate. No canvassing. Maywood Publishers, P-923 Broadway, New York.

OUTSTANDING Easy selling products. No competition. Sample 10c. Mint Co., Baroda, Mich.

SELL Made to measure raincoats. Outfit free. Goodyear Rainwear, 18 West 22nd, New York.

BE Independent. Own your business; experience unnecessary, selling $10,000 accidental death, $30 accident; $25 sick weekly benefits—$10.00 yearly. Other amounts proportionate. Guaranteed steady renewal income. $250,000 deposited insurance department. Universal Policy, 716-A Lefcourt Bldg., Newark, N. J.

HIGH-GRADE SALESMEN WANTED

YEAR'S Income in 3 months! New federal, state and code laws create immense demand for simplified record system every business man must have to protect himself against fines and penalties. Millions users must buy again now. Our men selling 5 to 25 daily our office-posted, copyrighted Liberty Tax Record. $3.50 cash profit every sale. Repeat commissions without callbacks. Live leads furnished. Big season now. Choice territories going fast. Commonwealth Publishing Company, 508 So. Dearborn, Chicago.

SELL Stores new, sensational counter cards. Special sale, cut prices at 3c. Seven aspirin tablets 5c. Sell 25c size. Up to 177% profit for you and merchant. Razor blades, laxative gum, comb, etc., and many other exclusive, big selling items. No investment to start. Protected territories. Columbus Discovery Products, Dept. FC-35, Columbus, Ohio.

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SHOPOSCOPE Sells on sight. 200% profit. Free sample. Experience unnecessary. Write for catalog and plans. Procopax, Dept. 26-DD, 1956 S. Troy, Chicago.

NEW, Sensational 25c and 35c direct store sellers. No competition. Protected territory distributors, also direct to consumer allitime, part-time men wanted. Answer fully, stating territory desired. Quadrite Kleenway, 1954 Goodfellow, St. Louis, Mo.

SALES Demonstrators. U-Kan-Plate with pure silver. Looks like $5 plate. 8 oz. $1. Justice, 904 Wainut, Philadelphia.

SALESMEN: Acquainted with garages, filling stations, to handle local business. Write Colgra, 2626 N. Third St., Milwaukee, Wisconsin.

TYPOSE Having contact with large users of envelopes can add to their income by representing the Weaver Mailing Envelope Co., 715 13th St., Milwaukee (established fifty years)—makers of specialty envelopes in Kraft, Manila, Jute, Water-proof, Cloth-lined, and other papers.

EVERYBODY Buys business stationery. New items. Highest quality. Lowest prices. Free outfit. Quick cash profits. Big commissions daily. Experience unnecessary. Self selling outfit free. Wilieus, 2132 Gladys, Dept. L, Chicago.

AUTO Accessory salesmen: Complete line fastest sellers. Prices dealers want to pay. Big commission daily. Exclusive territory. National, 1910-BM Wentworth, Chicago.

MAN—Handle regular store route. Place nationally advertised 5c-10c counter card inside. New aspirin deal. 16 tablets 10c. 85 more fast sellers. 100% profit. No investment. Catalog free. World's Products Co., Dept. 22810, Spencer, Ind.

PENNY Each, popular sizes. Non-tarnishable window sign letters. Enormous profits. Free working equipment, sample. Record breaking offer. Note our ad page 148A. Atlas Sign Works, 7941 Halsted, Chicago.

GIVE Profits—Up to $170 weekly, $500,000 punchboard firm announces new no investment plan. Season starting. K&S, 4326 Ravenswood, Chicago.

BIG Profits in stationery monogram device. Box 150, Wanda, Ill.

100 BLADES 50c. Shaving cream 4½c. Toothpaste 4½c. List 300 items free. Mayo, Richmond, Va.

MAKE Big money steady. High grade coveralls, shopcoats, pants, shirts, summer suits. Advertising on back. Fast sellers. Free outfit. Strong Mfg. Co., 901 West Jackson, Dept. N-10, Chicago.

NEW Roosevelt calendar and many other subjects. Sells on sight. Every home and business a prospect. Fleming Calendar Co., 6541 Cottage Grove, Chicago.

SELL: Line sign; very hot; hurry. Cost $1.73 doz. Sample 20c. Accurate, 2432 Milwaukee, Chicago.

SALES Books and labels. Sell sales books in small quantities at attractive prices, also "Loseproof" pocket label that sells at every stop; good commissions. Technocraft, 81 Kingston, Boston.

NEWS! Most amazing deal for stores, shops. Inexpensive. Big business increase or money back. Gold mine for salesmen. Outfit free. Stimulators, 343 Madison, Chicago.

AMAZING Zipper pinless clothes line. Lightning demonstration, sure sale every home. Free guarantee sales plan. Dunn Bros, Hempstead, N. Y.

BRAND New grab-bag deal. Going big everywhere—big profits—swift sales—fast repeats. No restrictions. All dealers buy. Act! Kaye, 4757 Ravenswood, Chicago.

MAKE More money selling shirts, ties, underwear, dresses, hosiery, raincoats, sweaters, coveralls, pants, uniforms. Outfit free! Nimrod Company, Department 65, 4922-28 Lincoln Avenue, Chicago.

SOMETHING New in fire extinguishers. Red Comet automatic. Proved in west fire years. Exclusive territory. Low price opens wholesale. Write Red Comet, 404 Comet Building, Littleton, Colo.

SALESMEN—Sell collection systems. 400% commission. Sayers Systems, 2801-123 Sheffield, Chicago.

STICK-ON Window sign letters. 300% profit. Free samples. Metallic Co., 438-A N. Clark, Chicago.

NEW Specialty—Sells every business and professional man. Four $15 sales daily pay $280 weekly. Average $1200 a month, three months. Write, F. E. Armstrong, President, Dept. PM, Mobile, Ala.

SELL Stores and homes—Scissors sharpeners, gas lighters, razor blades, aspirin, breath gum, chewing laxative, adhesive tape, polish, handkerchiefs, polishing cloths, shoe laces, many others. Attractive displays. Catalog free. Superba Co., S-303, Baltimore, Md.

HELP WANTED

MAN Wanted—Manufacturer established 45 years will finance responsible man with complete stock of merchandise food, farm and household necessities—you pay when sold. Mighty attractive proposition. Good living right from start. Write at once for interview in industrious man. Big value combination deals and fast selling specials now in effect. R. D. Anderson just sold over $3200. O. W. Jack over $308 in one week. Pleasant outdoor work. Experience unnecessary. No slack seasons or layoffs. Write today for "No-Investment" offer. McConnon & Company, Dept. 6938, Winona, Minn.

REAL Jobs open—Auto mechanical field, aviation. Earn $35.00-$75.00 weekly. 8 weeks' training qualifies you. Write for big opportunity book and special low tuition now. McSweeny Schools, Dept. 10-A-12, Cleveland, Ohio, or Kansas City, Mo.

DO You want a splendid chance to make $60 a week? I'll start you with a local coffee route; pay you steady weekly income. No experience required. Get free facts, then decide. Albert Mills, 4673 Monmouth, Cincinnati, O.

EARN Quick cash raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Easy, odorless method. Book free. United, 3848-BX Lincoln Ave., Chicago.

EARN Up to $25 or more weekly, growing mushrooms in cellars or outbuildings, all fall and winter. We instruct you. Ready market. Booklet free. Adanac Mushroom Company, Dept. 147, Toronto 10, Canada.

EARN Money selling shoes and get a salesmanship course free. Write Byon Bolton, Paris, Ill.

GROW Mushrooms. We show how. Use cellar, shed, etc. Plant now. Overnight crops. Spare time. Splendid income. Data free. Interstate, PN-7357 Cottage Grove, Chicago.

BIG Money growing mushrooms. Cellar, idle places. Supplies furnished. We buy crop. Free book. Mushroom Growers of America, HG-453 N. Clark, Chicago.

AGENTS—Mosco corn and calious remover will build you a steady repeat business. Send today for pocket-size sample. The Moss Company, 44 Searle Bldg., Rochester, N. Y.

EDUCATIONAL AND INSTRUCTION

"HIGHER Arithmetic" teaches fast and correct figuring. Frederick A. Smith, 2410 Smalley Court, Chicago.

MILWAUKEE Industries desire to contact earnest young men to learn electric arc welding in their laboratories of the school of engineering. Small training fee. For details write President Werwath, 1020-26 N. Broadway, Milwaukee, Wis.

WANTED: Names men wishing government jobs, $141.00 month. Position; specifics free. Franklin Institute, Dept. K3, Rochester, N. Y.

HAVE You been disappointed in answering want-ads? Let us write your application letter and get results. Send details enclosing $2.00. Eberhard, 400 Kinloch Bldg., St. Louis, Mo.

FLORIDA Hotel positions. Instructions. Richard Lee, 22 Wexter, Somerville, Mass.

BECOME A successful investigator. Experience unnecessary. Work at home or travel. Write today for free publication and particulars. National System, 340-G Electric Building, Omaha, Nebr.

STUDY Investigation—Solve crimes—Earn easy money. Write International Secret Service Institute, PM-124, Hoboken, N. J.

JAZZ Piano course. Modern, simple, successful, complete, sent prepaid for $1. Spencer Music School, 2504 E. 4th Street, Chattanooga, Tenn.

LEARN Doctor of Theotherapy. World-wide instruction. Seminary, South Whitley, Indiana.

MEN Wanted—To learn Machinist trade Tool and Die making, Automatic screw machine. Get reference on actual work. Employment help. Start now. Days—evenings. Write for free book. Allied Screw Machine Co., 601 Lake St., Chicago.

GET U. S. government job—Start $105-$175 month. Men-women, age 18-53. Are you eligible for civilfiling? Write at once for free questionnaire—find out. No obligation whatever. Instruction Bureau, 101, St. Louis, Missouri.

BECOME A landscape architect. Easy to learn by mail. Wonderful opportunity for money-making. Earn while you learn. Write for free opportunity booklet and details. American Landscape School, 805 Plymouth Bldg., Des Moines, Iowa.

U. S. GOVERNMENT Positions. $1700-$1900 and up a year. Let our expert (former government examiner) prepare you for a position in the railway mail service, rural carrier, post office, customs and other branches. Write today for free booklet. Dept. S, Patterson School, Rochester. N. Y.

SHORT STORIES

"THE Plot Builder"—Endless source of plots! 50c. International Agency, Cincinnati.

PRINTING, MULTIGRAPHING AND MIMEOGRAPHING

200 NOTESHEETS, 100 Envelopes, printed, name, address. Send $1.00. Raymond Lemieux, Danielson, Conn.

PERSONAL Stationery—18 sheets, 18 envelopes, Cellophaned 25c (mail). Liberty, 241-37 New York.

PRINTING, Mimeographing, low prices. Free estimates. Hunt Co., Box 202, Trenton, N. J.

FREE Portfolio colorful letterheads. Send 12c handling. Mark Warden Printing-Advertising, Box 4369, Kansas City, Mo.

629 CIRCULARS, $1.25; 8½x11, $2.00—Quantities. Folders, stationery, labels—low prices. Samples. Goodprint, Harrisonburg, Virginia.

MIMEOGRAPHING, 8½x11, $2.99—1000. Samples. Universal, A4629 Michigan, St. Louis, Mo.

250 LETTERHEADS, Bond, 8½x11—$1.00. Congressional Press, 619 H St., Washington, D. C.

1000 CARDS $1.40. 500 Letterheads, envelopes, billheads $1.75. Bradshaw, 3214 Huron, Chicago.

SPECIAL, 500 Letterheads and 500 envelopes, $2.50. Village Press, Somerset, Massachusetts.

2000 BUSINESS Cards neatly printed $1.50. Atlas Distributing Co., Roberts St., Pittsburgh, Pa.

ENGRAVURE Printing. Lowest possible prices. Samples free. Sunko, Mohawk, N. Y.

1000 ENVELOPES 6¾; Letterheads 8½x11, business cards, $2.95. Satisfaction guaranteed. Woodprint, Woodstock, Va.

UNIQUE Gummed labels; rubber stamps; engravings. McPherson Popular Print, Middletown, Conn.

PRINTED Stationery and cards. Circular free. Samples 10 cents. Menten, 9313 Glenwood Road, Brooklyn, N. Y.

STATIONERY, Circulars, checks, loose-leaf, ruling, binding. Commercial Press, Batavia, Ohio.

BETTER Grade printing, reasonable priced. Free samples. Economic Press, Leonia, N. J.

1000 BUSINESS Cards, card case, $1.50. Miller, Printer, Ambler, Pa.

1000 LETTERHEADS, Envelopes, circulars $2.95. Low prices leaflets, folders, catalogs. Mimeographing. Multigraphing. Samples. Frazer Press, Box 45-D, North Tonawanda, Kan.

PRINTING OUTFITS AND SUPPLIES

HAND Press, type and complete printers' supplies. Advise equipment you need and we quote prices; or send stamp for catalog. P. Peiffer, 16-A, 6 Columbia St., Newark, New Jersey.

PRINT Your own cards, stationery, circulars, advertising, etc. Save money. Easy rules furnished. Big profit for others, big profits. Junior press, $5.90; job presses, $11; power, $149. Write for free catalog and full information. Kelsey Co., V-11, Meriden, Connecticut.

NEW Type 20c font. Catalogue dime. National Type Company, Jackson, Mich.

MIMEOGRAPHING ink, $1.25 lb.; stencils, $1.25 doz. Uneoditionally guaranteed. Mailmarts, Cincinnati.

PRINTING outfits. Christmas gifts $8.00. Lists 3c. Landis, Richland, Pa.

REBUILT Presses. Advise size wanted. Send stamp. Exchange D-5, 480 East Main, Meriden, Conn.

DEALERS Wanted everywhere to sell printers' supplies. Write for our proposition. (Frank's), 3354 Harrison St., Chicago, Ill.

PRINT Your own circulars, envelopes, with home press costing less than $1.00. Illustrated instructions 10c. Carl Edgutt, Odessa, Minn.

LITHOGRAPHING, Printing presses, $4.00 up. "Barzatholus," 1354 Hayden, Cleveland. (Stamp.)

PRINTING Presses, type, supplies. Lawrence, 1126 South St. Francis, Wichita, Kans.

BARGAINS Used presses, type. Send stamp. Box 15, Cambridge, Mass.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

TYPEWRITERS AND SUPPLIES

TYPEWRITERS $1.00-$40.00. Ribbons 15c-35c. Mimeographs, adders, registers, watches. Knight's, 1517 Olive, St. Louis, Missouri.

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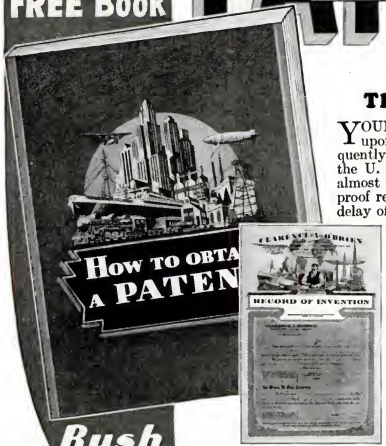

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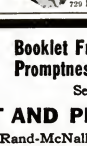

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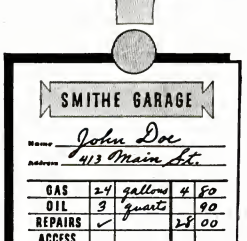

THOUSANDS of bills like this were sent out last Winter. Who paid them? Car owners who tried to save a dollar or so by using anti-freeze that boiled off.

Remember those spouting, steaming frozen-up cars you passed last Winter? Lots of those cars had been "protected" with an anti-freeze that boiled away. What good is that kind of "protection?" Why save a few pennies on anti-freeze and spend many dollars for major repairs?

Eveready Prestone will not only save you such expense, but will give you comfort and peace of mind. By actual tests, it protects against rust from 5 to 20 times longer than other anti-freezes. One shot gives full protection against rust, corrosion, and freeze-ups, no matter how warm the weather gets between the cold snaps.

Complete All-Winter Protection so Inexpensive

It's so easy and inexpensive to protect your car with Eveready Prestone (even down to 60° below zero if desired). Turn to Page 15A and see on the chart how little it costs to have all-Winter, one-shot anti-freeze protection for *your* car.

TURN TO PAGE 14A

How Science Measures "AUTO-FATIGUE"

BY ANDREW H. RYAN, M. D.

Dr. Andrew H. Ryan, well-known authority, tells you here exactly how he measured the effects of "auto-fatigue" on the human body during motoring, and the astounding facts he discovered.

"IT is a well-known fact that thousands and thousands of motorists suffer from 'auto-fatigue.' That is, long, hard drives, covering great mileage, or city driving with its difficult traffic conditions, often produce physical and nervous exhaustion.

"In my laboratory at Chicago, we determined to make a sound, scientific study of the nature and extent of this exhaustion. First, I developed or adapted a number of special instruments, all highly delicate in nature, to make these experiments.

"As subjects, I chose several carefully picked college men, and put them through a series of experiments extending over several weeks. Records were taken every morning before the driving started, then the men set out in a body, using different makes of cars, for 200 to 400-mile trips. Records were kept at varying intervals during the drive, and a complete comparison made at the conclusion.

"Figures for each make of car were kept, and I was interested to note that the drivers on the Dodge car showed 54% to 65% less nervous and muscular impairment, due to fatigue, than on other cars tested."

The astounding results of Dr. Ryan's tests are due to basic and radical advantages in Dodge engineering—to dozens of special comfort features that make riding easier. By a remarkable invention known as Floating Power engine mountings, vibration in a Dodge is completely smothered. Then, too, Dodge utilizes rubber at 56 vital points—protection against road shock, noise, bumps, and rough riding. The Dodge type of independent front-wheel suspension is also a means of increasing comfort. The easy action of hydraulic brakes assures easier, smoother operation—less fatigue.

Anyone can understand that vibration will slowly but surely shake an ordinary car to pieces. With vibration smothered, Dodge, of course, lasts longer. You don't have to pay out money for repair bills that constant vibration causes, either.

Go to any Dodge dealer and ask for a free copy of the booklet describing Dr. Ryan's tests. Drive a Dodge. See for yourself that Dodge is easier to drive, that it is easier on your nerves, that it gives an entirely new kind of comfort. Dodge Brothers Corporation, Division of Chrysler Motors.

POSTURAL STEADINESS TEST—This sensitive instrument measures accurately the amount of body sway (a sign of fatigue).

HAND-EYE COORDINATION TEST—This instrument measures hand steadiness and coordination with the eyes, to the *nth* degree.

VASCULAR SKIN REACTION TEST—This instrument records the reaction of the blood vessels of the skin to a tired nerve condition.

MOVIE MAGIC *in the* MAKING

SCENE from Goldwyn picture showing how sets, such as this interior of a compartment on a Russian train, are constructed inside the sound stage where both the scene and the sound are recorded.

BEHIND this water front scene from an RKO-Radio picture can be seen the "process screen" on which a movie of the ocean is projected from behind.

PART I

IN Hollywood thick walls padded and insulated like a butcher's ice box separate the everyday world from a strange land of illusion. With your guide you go through the "sound lock" entrance to a sound stage and, like Alice through the looking glass, step straight into a wonderland that makes you gasp. On the set you may find real South Sea islanders rehearsing a native dance. Inside another stage you may see a life-sized yacht stranded on a sandy beach.

On the "lot" where other scenes are filmed you stroll down a paved New York street and turn a corner to come upon the decks and superstructure of a liner rising from the ground, flanked on one side by the entrance to an old world cathedral and on the other by the squalid buildings of a typical Chinese water front. A few yards away, before the tiered boxes of a Roman arena, gladiators are engaged in a duel.

Nothing is impossible in pictures and if a plot calls for a scene that stumps the set designer the job is turned over to the special-effects department. Tricks that defy deception are used when lives would be endangered otherwise or when costs

D1037

THE street scene, above, was created by Howard Anderson who used the three by four-foot glass painting at the right, "matting out" the area on which the action was to occur with black paint.

D1037

CATALINA Island is a favorite spot for taking pirate and sea scenes like this. The realistic palms in the foreground are made of papier-mache.

D1837

FILMING a water scene inside an RKO sound stage. The speedboat cavorts in water inside a built-up wooden tank.

prohibit making a scene in real life. Instead of sending an entire company to Alaska for an Arctic picture a camera crew alone may go to film the scenery. Back in the studio fur-clad actors pose in front of a process screen on which the moving pictures filmed in the north are thrown from behind. Under the controlled lights of the studio the result is often better than if the whole picture had been filmed on the distant location. In front of such an animated backdrop a star may be filmed riding through the streets of London, golfing in Italy, and

D1037

ABOVE, the entire recording apparatus, including the camera lights and sound-effects equipment mounted on a platform, is moved along on wheels as the actors continue along the street. The long rod bearing the microphone is adjusted constantly in order to record the speech of the different actors. Right, stratosphere balloon gondola used in Monogram picture and built to exact specifications of balloon which made high altitude ascent.

CECIL B. DE MILLE and Sid Grauman, studio executives, studying sketches from which sets for a motion picture are to be designed.

hunting tigers in India all in the same day.

Spectacular airplane crashes, the bombing of a city, or the dramatic breaking of a dam are often done in miniature so perfectly that audiences are sure the picture is real. In the miniature department the craftsmen build tiny armies that appear to march and even midget horses, controlled by clockwork and wires, that move with lifelike motions. Accurate to the smallest detail and built exactly to scale, the models often require months to construct. For one picture a futuristic miniature of a city as it might appear half a century from now, with wire-controlled airplanes landing on the roofs, was built. To the single eye of the camera, size is a matter of perspective and often miniature buildings close behind the actors are used to give the appearance of distant backgrounds.

Picture audiences are super-critical and the test of any trick is its realism. One company that recently filmed the sinking of the "Titanic" made certain that the scene inside the dining room at the instant of the crash against the iceberg would be true to life by mounting the entire set on timbers and rollers and coupling it to a counterbalance. Then, when the set was shaken by a truck driven into the hidden timbers at an unexpected moment, the diners were thrown into confusion and the chandeliers rocked realistically.

One of the accomplishments of the movie magicians is to make animals act, or appear to act, exactly according to the

(Continued to page 126A)

Lionel Barrymore as Billy Bones in Treasure Island

D1037

THIS scene—fifty stories up—was made on stage floor with miniature city as background. Above, surf and sea background are projected from film.

D1218 Cont. Robert W. Isordia
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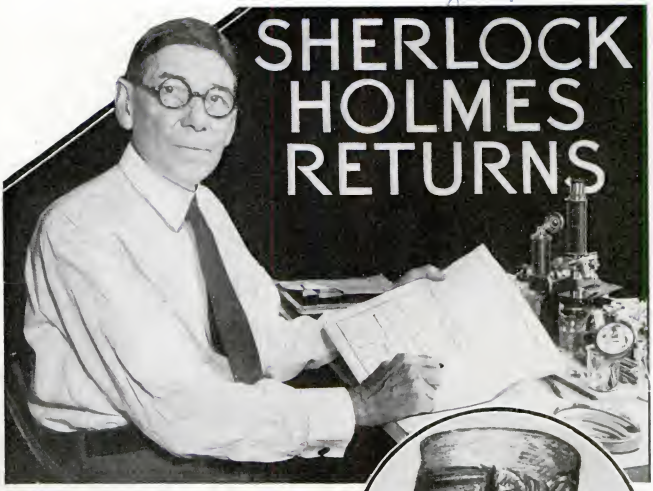
SHERLOCK HOLMES RETURNS



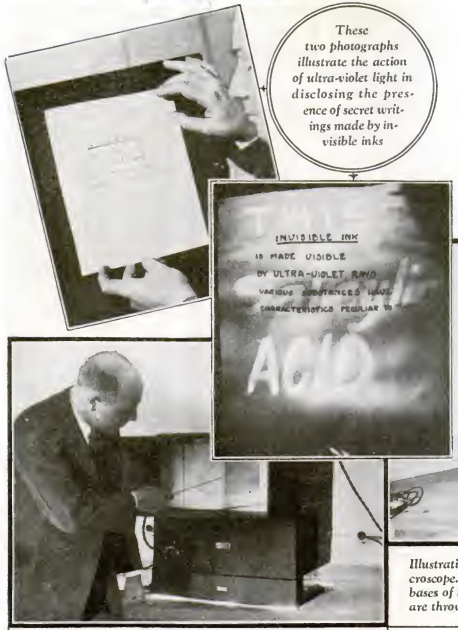
B. C. Farrer, Handwriting Expert, Who Decided from a Study of Ransom Notes That Lindbergh Kidnaper Was German Carpenter

"A METHODICAL Teutonic or German carpenter." That is the picture B. C. Farrer, handwriting expert of the treasury department, drew of the Lindbergh kidnaper even before any ransom was paid. This deduction was based on a study of the handwriting of the ransom notes.

Disclosures following the arrest of Bruno Hauptmann in the Lindbergh case seem to indicate that the famous Sherlock Holmes has been reincarnated not only in the person of the treasury department expert, but in the entire system of criminal investigation of the department of justice.

That the writer of the ransom notes was German would be apparent to the expert at a glance. That the writer was methodical is apparent

Sketch of Man Who Received Lindbergh Ransom Money Made from Description of Man Who Dealt with Him, and Photograph of Bruno Hauptmann



These two photographs illustrate the action of ultra-violet light in disclosing the presence of secret writings made by invisible inks

Illustrating the use of an instrument whereby the enlarged images of two separate fingerprints are thrown together on a screen in such a way that the lines of one flow into the lines of the other, if they are identical

Illustrating the use of a comparison microscope. The enlarged images of the bases of two cartridges or of two bullets are thrown together on a single eyepiece

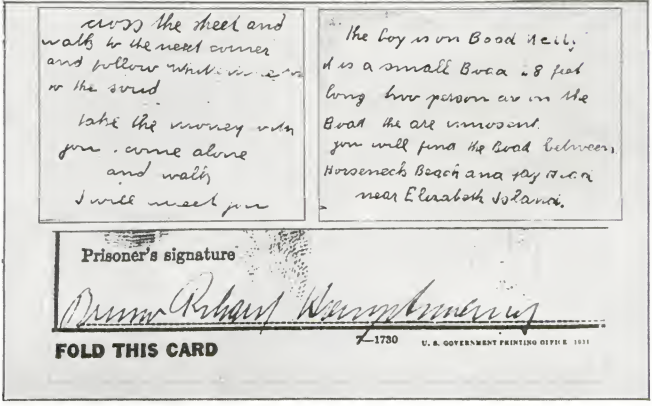
from the deliberateness of the writing and the careful planning revealed in the text. A detailed drawing of the box in which he wanted the money delivered, together with a certain stiffness of the writing, always found in those who work with their hands, and the square holes in the ransom notes evidently punched with a file, indicated that he was a carpenter.

Observations of detectives added to and corroborated the work of the handwriting expert. The homemade ladder used in the kidnaping could only have been built by a carpenter, for the rungs were perfectly mortised, and although forty-eight nails were driven flush there was not a single hammer mark on the wood. A broken rung fixed his weight at about 160 pounds. The wood in the ladder was traced to a Bronx lumber dealer, and when the ransom money began appearing in an area with the Bronx district as its center, the search was centered in that locality. With emery dust and glycerine appearing on this money under the microscope, further proof was given that the kidnaper was a mechanic or carpenter who sharpened his own tools. A musty odor indicated that the money was kept underground.

But in spite of the accurate verbal descriptions given by Sherlock Holmes, he was never able to furnish fellow detectives with an actual likeness of his quarry. How the department of justice special agents did just this constitutes a distinct advance in scientific crime detection. James T. Berryman, sports cartoonist of the Washington Star, was called in to furnish a pictorial likeness of the man who received the ransom money. Berryman called on John

D1218

F. ("Jafsie") Condon, who passed the money through the cemetery hedge in 1932, and obtained a description of the kidnaper. Then going to the public library he requested files of illustrated German magazines. Selecting portraits of the oval Teutonic type of face he made composite sketches of the type. Returning to Condon with the sketches, the aged educator pointed out where the features of "John" differed from those of the composite—the mouth a little straighter, the droop of the left eyelid more pronounced, a line at the side of the mouth, and the cheeks a bit flatter. After four hours of erasing and redrawing, Condon pronounced the likeness as nearly perfect as his memory could direct. Berryman made finished drawings of these sketches, which were photographed and distributed to detectives working on the case. The remarkable results obtained by Berryman can be seen by comparison of the sketches, reproduced



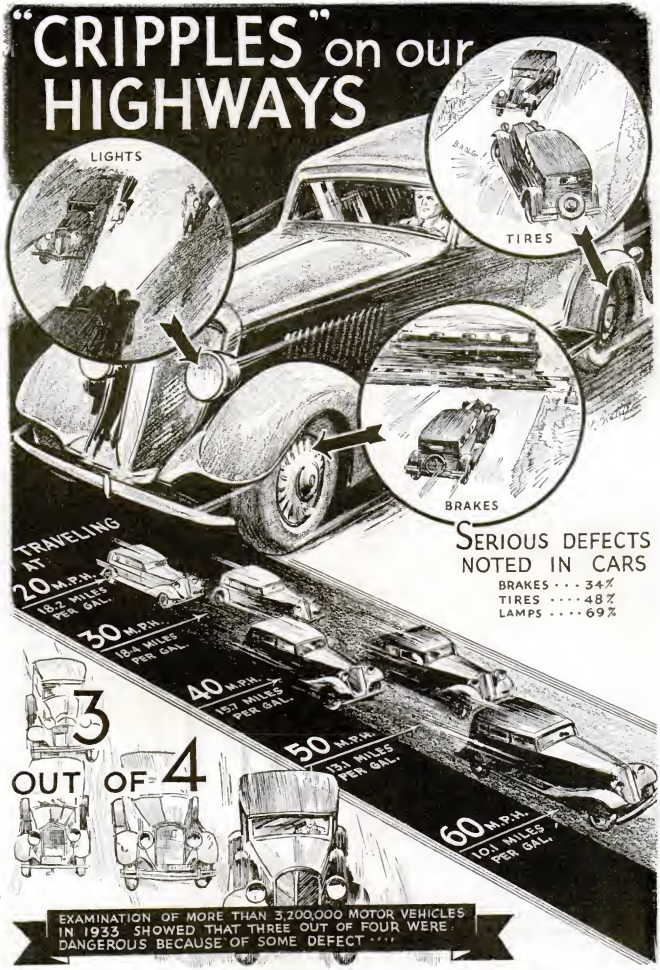
Above, Map of Manhattan Which Aided in Tracing Ransom Money; Colored Pins Were Placed in Map to Indicate Points Where Money Had Been Passed; Below, Handwriting Experts Claim to See Similarity between Hauptmann's Signature and Writing in Ransom Notes

here, with photographs of the suspect now under arrest.

But this Sherlock Holmes method of building up a picture of an unknown suspect from meager clues has not been confined to the Lindbergh case. The laboratory of the division of investigation is equipped to take this sort of work in its stride. For instance, there have been over 800 types and sizes of tire treads manufactured in the United States in recent

(Continued to page 134A)

D1232



Note: See Next Issue for Other Hints on Safety First in Driving Your Car

How Fast CAN YOU STOP?

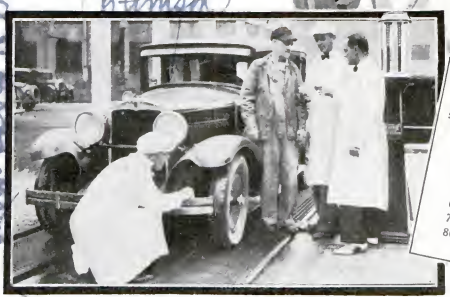
WITH the death toll from automobile accidents increasing all over the country, and the cheapest car built able to do over eighty miles an hour, engineers are turning from brute speed to meet a public demand for "The Safest Car in the World."

Since 1930 approximately 145,000 persons in the United States have been killed on the highways and the total accidents have risen to more than 800,000 a year. "Safety Lane" tests have demonstrated that seventy-five per cent of the cars now in operation are in defective condition.

Safety glass all around, sturdier body construction, driver's license, and, above all, periodic inspection of brakes and tires are being emphasized by legislative enactment in many states. Power brakes and centrifuse drums, to eliminate warping, have helped, but inventors and engineers are still busy on the problem of quicker stopping.

One of the most recent developments is brakes that work on the principle of a disc-type clutch.

(Continued on page 142A)



Average Stopping Distances
FOR 4-WHEEL BRAKES

Speed M. P. H.	Stop Feet
10	5
20	20.5
30	36
40	82.5
50	129
60	186.5
70	252.5
80	330

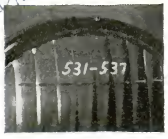
Top: Latest Clutch-Type Brake; Below: a "Safety-Lane" Test and Table Showing Average Time Required to Stop Car Traveling at Different Speeds

Sample of Wood Inlay That Can Be Made Easily with Designs Shown on the Table

WOOD INLAYS MADE EASILY WITH PREPARED VENEERS

Wood inlays, made by gluing beautiful veneers to wooden articles without using clamps or veneer presses, are easy to produce by working with a new process. The veneers, prepared in advance, are treated to prevent curling while the glue is setting. Backs of the veneers are coated with a special glue. After moistening this glue, the veneers are attached to the wooden article by pressure of a hot flatiron. More than twenty-five designs, cut to fit together like a jig-saw puzzle, are available.

HIT-AND-RUN DRIVERS TRACED BY NUMBERS ON LAMPS



Some cities are considering a plan for detecting and apprehending hit-and-run automobile drivers which involves etching recorded numbers in the lenses of head lamps of each vehicle. The plan is based on the fact that the lenses are often broken when such drivers are involved in accidents and are the only evidence remaining after they have fled. The numbers etched on each car's lamps would be filed for a permanent record and tracing drivers would be easy if the numbers were found at the scene of an accident.

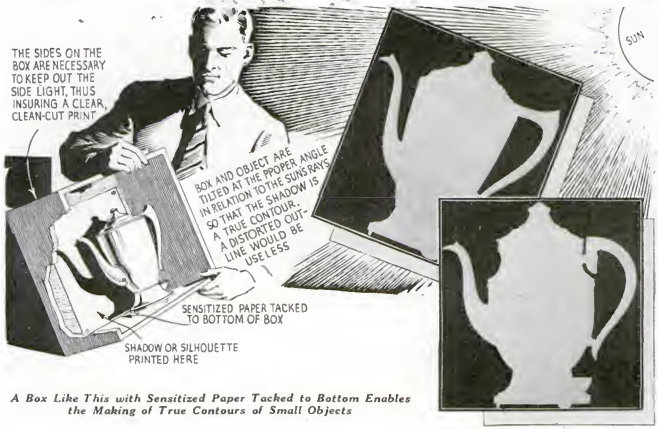
HARDEST MAN-MADE MATERIAL GRINDS BEST ALLOY TOOLS

Tools made of the new hard alloys, known as cemented tungsten carbides, may be cut and lapped with an abrasive that is the hardest material ever produced by man. It closely approaches the hardness of the diamond. This material is chemically known as boron carbides, being a combination of the rare metal, boron, and ordinary carbide. It readily scratches and cuts the hardest synthetic materials. The strongest acids and alkalis do not affect the abrasive, which has a compressive strength of 260,000 pounds per square inch, although it is lighter than aluminum. The material is little affected by temperatures up to 1,000 degrees centigrade, at which point the diamond burns completely. Boron occurs in large amounts in the form of minerals which contain it as an oxide, these minerals being known in the form of borax. The abrasive is prepared in

Top, Boron Carbides; Bottom, Some Shapes into Which the Material Can Be Fashioned

high-temperature electric furnaces. One application of the new material is in the form of sandblast nozzles, which last several thousand times longer than metal nozzles ordinarily used. Other applications will be in grinding of tools, where diamond dust has been used as the abrasive.

'Shadow Printing' Speeds Up Drafting Work

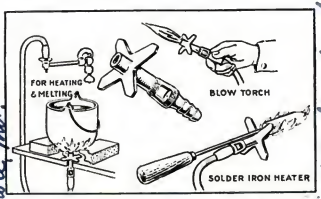


A Box Like This with Sensitized Paper Tacked to Bottom Enables the Making of True Contours of Small Objects

To enable draftsmen to obtain true contours of small objects, a method of "shadow printing" has been developed. Heretofore it has been difficult for the draftsman to reproduce quickly the true contours of an article such as a percolator for the factory blueprints. By the short-cut method, the model is fastened in an open box having four sides and a bottom. A piece of sensitized blueprint paper is tacked on the inside bottom boards of the box and the box and model are then exposed to the sun's rays at the proper angle for the time required to obtained a clear print. The great distance of the sun in relation to the nearness of the model to the sensitized paper results in an accurate outline. The sides of the box are necessary to eliminate any lateral reflection. The paper is developed in the usual way and on it are placed the dimensions, designs and decorations. Tracing paper is then placed over the shadow print and the shadow is copied.

GAS BLOW TORCH IS COMBINED WITH SOLDER IRON HEATER

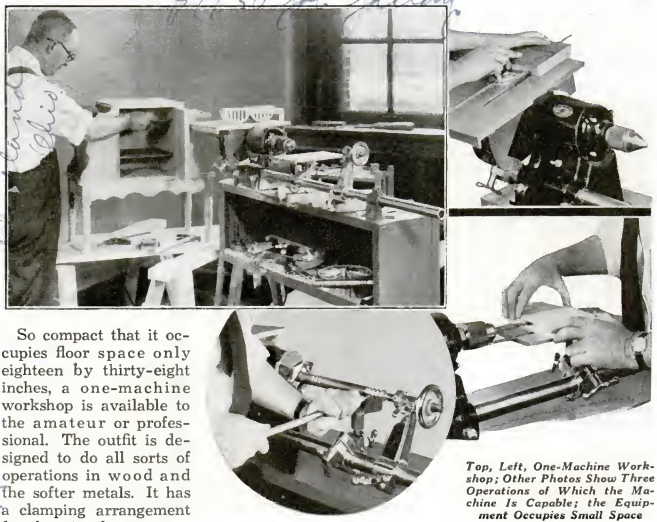
Ordinary size solder irons are heated in less than a minute with a combination gas blow torch and solder iron heater which can be attached by means of a hose to any gas jet or gas connection. It gives an even steady flame eight inches long and one inch in diameter and there is nothing to adjust or get out of order. Construction for back draft eliminates the need for an air tank for a blow flame. The arms on the torch serve as a support to hold the flame above the work bench and to hold the iron in place for heating.



This Gas Blow Torch Can Be Used for Many Purposes, Including the Heating of a Soldering Iron

¶ Drinking straws made of Cellophane are durable, spring back into shape when bent, and are unaffected by carbonation.

Wood and Metal Workshop in Compact Unit



Top, Left, One-Machine Workshop; Other Photos Show Three Operations of Which the Machine Is Capable; the Equipment Occupies Small Space

So compact that it occupies floor space only eighteen by thirty-eight inches, a one-machine workshop is available to the amateur or professional. The outfit is designed to do all sorts of operations in wood and the softer metals. It has a clamping arrangement for changing from one attachment to another in a few seconds. The workshop can be set up in thirty minutes. Here are some of the things the outfit, announced by the General Electric company, will do: saw wood up to one and three-fourths inches thick; turn wood with a limit of nine inches diameter for faceplate work; turn brass and aluminum; sand flat surfaces and contours; scroll work on wood up to two inches thick and metals including sheet iron; drill wood and metal and cut rabbets and grooves. The machine has a smooth-cutting, hollow-ground circular saw and a full-sized industrial type chuck of half-inch capacity.

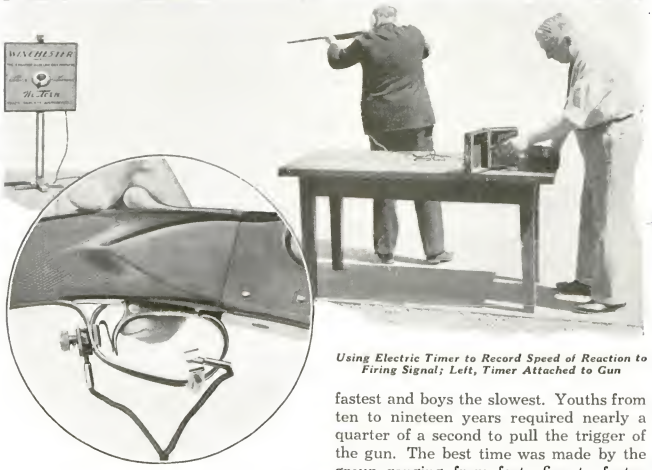
RUBBER "SHOES" ON AIRPLANES WARD OFF HAILSTONES

Hailstorms offer a particular hazard to the big all-metal passenger planes. The speed of the ship is its own undoing and even a small stone striking the leading edge of a wing leaves a sharp dent. In landing, the horizontal stabilizer at the rear is also bombarded with gravel and rocks thrown up by the wheels and receives its share of dents. To prevent this denting, rubber "shoes" are now being worn on stabilizers and wings. They are shaped to conform with the airfoil section and are vulcanized on the leading edge of the wing where they absorb the blows.

All-Metal Airplane Wing Dented by Hailstones; Rubber "Shoes" Now Prevent Such Damage

D 1156 Winchester Releasing Arm 6
Wm Hazel Cinti

Timer Shows Mature Man Fastest on Trigger



Using Electric Timer to Record Speed of Reaction to Firing Signal; Left, Timer Attached to Gun

It has long been known that there is a lapse of time between the instant you decide to do a thing and the instant you actually start doing it. This is known as the reaction time and is the period between the instant you decide to stop your car and the instant you actually step on the brake. Young men somehow have gained a reputation of possessing a quicker reaction response than their elders. It has been taken for granted that a young man is justified in taking more chances in driving a car, for instance, than an older man because it was assumed he was able to think and act faster. This reputation of the youngsters for fast thinking was shattered recently by tests with an electric timing device developed by a gun manufacturer. The shooter was told to pull the trigger as soon as possible after he saw a light flash on the target. When he actually pulled the trigger, he closed a switch attached to the gun and the device measured the time between the flash of the light and the pulling of the trigger. Tests with groups of different ages showed that the mature man reacted the fastest and boys the slowest. Youths from ten to nineteen years required nearly a quarter of a second to pull the trigger of the gun. The best time was made by the group ranging from forty-five to forty-nine years who averaged less than one-fifth of a second, the low man requiring fourteen-hundredths of a second to pull. The average time for the group from twenty to twenty-nine years was .203 second and the group from forty to forty-four set the same average while those from thirty to thirty-nine averaged exactly one-fifth of a second. The average for all men from twenty to forty-nine was one-fifth of a second. For those from fifty to eighty-five years old, the average time reaction was a trifle higher, .202 second, and the figures were not quite so revealing. The age group from sixty to sixty-nine made the best showing with an average of one-fifth of a second, the averages for other groups ranging from .206 to .219 second. One man eighty-five years old had an average reaction time of .218, his slowest time being about the average for the group from ten to nineteen years. It is claimed that the greater experience of the older men did not account entirely for the better marks they set as some had comparatively little shooting experience.

Reference R. V. Collins
2719 E. Florence Ave
Los Angeles Calif

D1081

Cml. Thos. E. Stevens, Jr. 1055 65
Holmain Ave. Los Angeles, Calif

DARE-DEVIL

Starting the Engine of a Racer and, Below, the End of a Jump; a Good Driver "Flies" Thirty Feet across the Water and Goes as High as Eight Feet in the Air

PLUCK and luck go hand in hand in the hair-raising game of riding a match-box boat across rough water at fifty miles an hour. It takes courage to leave the throttle untouched when another boat's wake threatens to spill you. And real luck rides with the winner of a long race, for an acrobatic speed boat is a dangerous mount.

One of the worst things that happens is a spill when half a dozen boats are roaring around a turn so close their sides are almost rubbing. Then a spray-blinded driver in the rear may hit a hole in the churning water that upends his boat and catapults him through the air. The safest way to hit a turn is crouched down in the left rear corner of the cockpit so that the hull can bite the water and avoid a slide.

Riding on the "step" in choppy water, the submerged propeller may strike a piece of driftwood that spins the boat around like a top. A higher wave than usual may catch the bow and turn the boat end for end in the air. Or if the water is choppier than usual the repeated impact against the waves may injure the driver badly. In the two-seater runabouts the mechanic suffers the most for he "rides the deck" to keep the bow down in the turns. In good racing weather the whole hull of the boat rides free of the water half the time and whenever it hits a wave top there is a spine-jarring crash. Mechanics have been pounded unconscious by this rapid fire beating. In a long race a daring mechanic will refuel on the fly, balancing a funnel and a five-gallon can of gasoline over the motor while hanging on with his feet. Yet few who get a taste

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"WATER BUG" RIDERS

Above, Racers Rounding a Buoy; Note Mechanic in Foreground "Riding the Deck"; Below, This Driver Has Just Crashed into a Boat Which Had Overturned

of speed-boat racing ever want to quit. One of the reasons, probably, why the game has such a fascination is that any novice may turn out to be a dark horse and steal the show from "big shot" drivers. It takes more than mere driving skill and a good motor to make a record. The tricky little "water bugs" move fastest when the humidity is high, allowing good carburation, and when the wind kicks up a six-inch chop that permits the hulls to skate from crest to crest.

Among the top-notch drivers are the acrobats who risk their lives in breath-taking stunts. Reg Brown, who hurls his boat through a real brick wall at fifty

6116 Selma Ave Los Angeles, Calif.

D 1081

Above, Driver and Mechanic Throwing Weight to One Side to Make Short Turn; Below, a Racing Runabout and a Nose-and-Nose Finish

miles an hour, entertains spectators between races with such tricks as jumping his boat through a flaming hoop or hurdling another boat. The hardest part is to keep the boat balanced so that it will not turn over in the air. He also can make a headstand on deck and steer by means of cables at top speed, trade boats on the fly, and drive a golf ball off a bobbing deck. His hardest trick, he says, is to ride two boats Cossack style, with one foot on each of the boats running side by side. Even a slight miscalculation of balance would result in a dangerous spill.

More racing thrills are provided by the modern "short tracks" half a mile long around four buoys marking a square. Driving skill is at a premium and as many as half the entries may "flip" before a race is over. Because of their speed the boats are in a wide turn most of the time and some drivers compensate for this by building non-tip chines on the hulls so that the boats will slide instead of turn over in a cross-chop. Even a strong wind, catching the bow high in the air, has turned a boat over in a turn. A steering cable may break or the tiny fin keel may become detached, in which case the boat makes a broadside skid down the course.

If you want to break into speed-boat racing you can do it for $150 and up. If

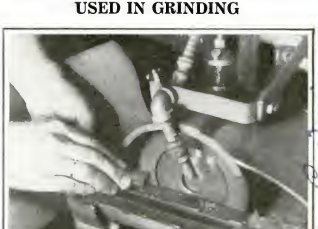
you live in the east you probably will want a single-seat hydroplane while in the west the two-man runabouts form the most popular racing classes. In the hydroplanes you have your choice of four types ranging from the A class that carries a twelve-horsepower engine to the F class powered with a sixty-horsepower outboard. In the racing runabouts you must use a hull that is thirteen feet long and weighs not less than 275 pounds. Your class will depend on the size of the engine.

For the minimum price you can buy a secondhand motor and build your own hydroplane hull, a combination that may develop forty miles an hour. If you want everything new and a real chance at a record you may spend as much as $600 or $700 for an F hydroplane or an F racing runabout. Most drivers must be prepared to spend almost as much again on maintenance, for repairs are costly on a tiny power plant that "winds up" to five or six thousand revolutions per minute.

A new type that may become popular is the "inboard-outboard"—powered with a marine engine or a converted four-cylinder light automobile engine of 220 cubic inches displacement that is fitted with an outboard drive. Boats of this new class

(Continued to page 128A)

REAL DIAMONDS COAT TOOLS USED IN GRINDING



Diamond-Edged Grinding Wheel in Use; Layer of Crushed Diamonds Coats Wheel Surface

Genuine diamonds are being used for coating grinding wheels. Stones that are off color or too small for the market are crushed and graded, mixed with a special bond and coated on a composition form to a thickness of one-eighth inch. The diamond layer is applied to the side of the wheel form for side grinding and to the periphery of the form for cylindrical grinding. Wheels of three degrees of coarseness are produced in this manner, covering a range of work from coarse grinding to production of an exceptionally keen edge. The wheels are used for conditioning the hardest machine tools.

RUBBER-"BAKELITE" SANDWICH HAS VARIETY OF USES

"Sandwiches," consisting of layers of soft rubber between sheets of laminated Bakelite are meeting the demand for a durable and long-wearing material which is as soft and pliable as rubber. Many combinations are possible since the layer thicknesses, as well as the number of alternating sheets, can be varied. The product is being used for gaskets where a combination of strength and resiliency is desired and it is also being used for machine mountings to absorb vibration. It can likewise be employed for table tops, serving trays, wall paneling and similar purposes.

HAMMER KIT FOR HOME HOLDS SIX VARIETIES OF NAILS

Six varieties of tacks and nails used about the home are held in a handy nail and hammer kit which keeps such objects always assembled and ready for use. Turning the hammer head to the right opens any compartment in the top and turning it to the left closes the opening. The hammer has a magnet with which to pick nails or tacks out of the kit.

Lowering a Baby Elephant in a Sling from a Liner on Which It Crossed the Ocean to a Plane in Which It Completed Its Journey

BABY ELEPHANT RIDES IN PLANE AFTER CROSSING OCEAN

At least one baby elephant has become a sophisticated traveler for it crossed the ocean in a modern liner, then finished its journey by plane. The animal was consigned to Bridgeport, Conn., and the boat which brought it across the Atlantic landed at New York. There it was placed in a sling and a crane lowered the baby from the boat into a large Sikorsky plane which carried it to its destination. The young elephant seemingly suffered no ill effects from the trip.

LAMP GUARD HAS FOLDING END FOR REMOVAL OF BULB

Easy removal of the bulb is a feature of the latest electric lamp guard. Made of heavy wire, the guard has a lower section or end that may be opened or closed at will. After the bulb has been screwed into the socket, the wire frame is folded or closed, giving full protection. Opening the end of the frame permits easy removal of the lamp. The guard is attached to the electric socket by a screw that tightens a ring around the socket. A hook on one side of the guard may be used for hanging the lamp in inverted position.

LEAD AND BRONZE BEARINGS REPLACE BABBITT

Connecting-rod bearings composed of a lead and copper lining with a steel backing are being used instead of babbitt bearings by one automobile manufacturer to increase the life of such bearings to the approximate life of the car. It is claimed these bearings make possible an increase in engine speeds with present engines, an increase in horsepower with no increase in engine size or weight, a shortening of present engines by permitting the use of narrower bearings and the possible elimination of the need for oil temperature regulators on some engines. Such bearings

Bearings of Lead and Bronze Backed with Steel Which Are Now Being Used in Automobiles

have been used in aviation engines, in some types of Diesel engines and in the modern high-speed rail cars. During the war it was found that connecting-rod bearings on some airplane engines failed because of repeated flexing of the original bronze backing for the babbitt bearings. Steel was then substituted for bronze, the bearings remaining babbitt-lined. The relatively low resistance of babbitt itself to fatigue under high loads and temperatures then brought about the adoption of a bronze lining with a high lead content. The art of producing such bearings has now reached a stage where they can be made commercially in any quantities and to consistent manufacturing standards, thus enabling their use in auto engines.

"Ghost Army" Pulled on Wires Used as Targets for German Marksmen

CARDBOARD "ARMY" IS TARGET FOR GERMAN RIFLEMEN

German troops stationed in a barracks near Berlin practice marksmanship with the aid of a "ghost army" which makes its home in a near-by forest. The ghost army consists of full-size cardboard figures representing soldiers. The figures are pulled through the trees on wires, and the marksmen fire at the moving targets.

LINOLEUM BLOCK AND CUTTER SPEED UP WORK

Direct sketching, as well as cutting and gouging, is facilitated by a new white-surfaced linoleum block which makes it possible to transfer the subject without reversal of the image. A transfer fluid makes this feature possible. A new cutting tool used in the same work has five interchangeable knives which are held securely in the handle by turning a set screw with a small key.

Linoleum Block Shown with Improved Five-Knife Cutter That Reduces Working Time

TWO-IN-ONE WORK GOGGLES GIVE DOUBLE PROTECTION

Serving the purpose of two sets of goggles, a new two-in-one goggle is available for chipping and welding work. One set of lenses protects the worker's eyes against flying chips and particles. Another set, which folds over the first, protects the eyes against dangerous light rays and glare.

Goggles with Light Filter Lenses Raised

D 1023 Cmt. Maxwell Reid Israel 541 1/2 Glendale Blvd Los Angeles Calif

Mysteries of EPIDEMICS

Right, Drawing Off Blood from Volunteer Donor for Use in Preparing Infantile Paralysis Serum; Below, Filling Vials with Serum to Be Used in Fight against the Disease

CRATES of chattering monkeys, unloaded from express cars at Los Angeles a few months ago, signaled science's latest major offensive in its ceaseless war on disease.

Infantile paralysis, flaring up in near-by desert valleys, was rapidly sweeping across southern California. To the stricken area, famous medical specialists hurried from all parts of the country. Forces were concentrated for a hand-to-hand battle with one of mankind's most terrible scourges.

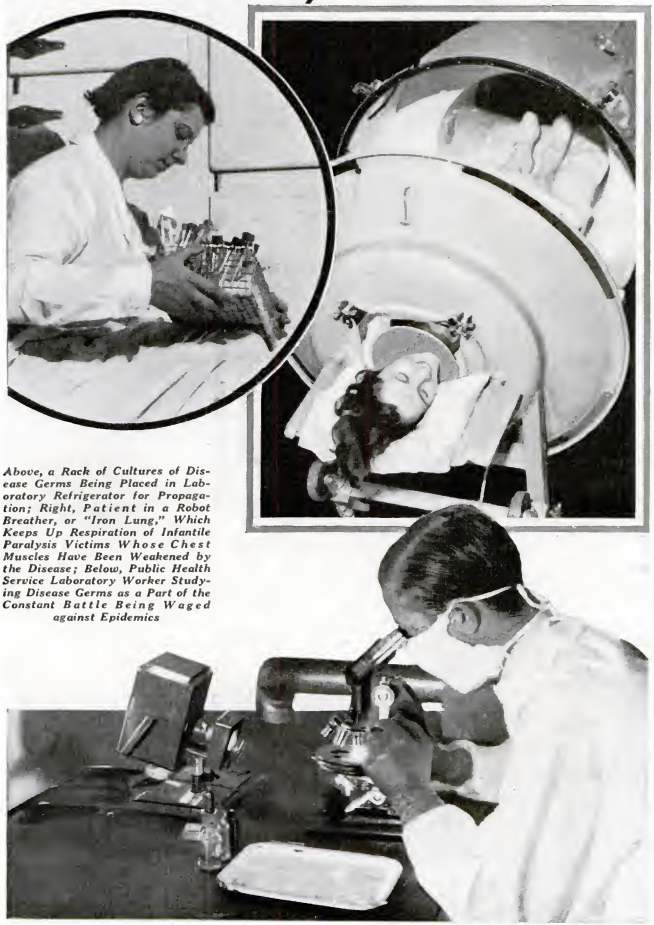
In long rows of beds in the isolation ward of the general hospital the medical men found scores of infantile paralysis victims. From nasal washings and from fluid tapped from the spines of these paralytics, they obtained living virus samples with which to inoculate the monkeys, the only animals whose spinal structure is like that of man, permitting study of the disease without taking human life.

As early as last December, health authorities had begun to marshal their forces along this section of the country, where they believed that infantile paralysis, always a smouldering menace in any part of the world, was about to break out in epidemic form. The dread disease had been increasing from month to month, following the mysterious law which every three years causes it to burst into unusual activity.

When the disease began to increase the medical forces were ready and an army of experts went into the field. Two hundred health inspectors were enlisted to enforce quarantine and sanitary laws rigidly. Wa-

D 1023

Attacked by SCIENCE



Above, a Rack of Cultures of Disease Germs Being Placed in Laboratory Refrigerator for Propagation; Right, Patient in a Robot Breather, or "Iron Lung," Which Keeps Up Respiration of Infantile Paralysis Victims Whose Chest Muscles Have Been Weakened by the Disease; Below, Public Health Service Laboratory Worker Studying Disease Germs as a Part of the Constant Battle Being Waged against Epidemics

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ter from swimming pools was microscopically examined and restaurants, dairies, and water sources kept under strict scrutiny. A corps of nurses was drafted to visit homes. Every suspect was rushed to a hospital, given serum as a precautionary measure, and placed in an isolation ward under the eye of specialists. Warnings were broadcast by radio, the press, and through the schools.

In bacteriological laboratories technicians began to prepare huge quantities of serum. An appeal went forth for blood. From among 1,400 former patients whose blood was known to contain precious "antibodies" with power of neutralizing the virus, hundreds who had been helped to throw off the crippling paralysis responded generously. In the laboratories, revolving centrifuges, spinning at dizzy speed, separated clear serum from the blood, like dairy separators skimming off cream. Its potency tested, it was mixed with an antiseptic solution and bottled in vials to be distributed free to any doctor on request.

Above, Labeling Culture Tubes from Suspected Disease Victims Prior to Analysis; Below, Removing Colonies of Bacteria from Culture Plates

In the hospitals, "iron lungs" breathed for those whose chest muscles were par-

alyzed. Experts tested reflexes, tilted beds, and used mechanical contrivances to keep muscles from twisting under the paralyzing influence of the disease. When the fight was won, the work of salvaging the bodies of the paralyzed victims started. Electrical currents, radio waves, and heat are being used to rebuild wasted muscles and rekindle dying nerves. Swimming in a huge salt-water tank, aided by floats and ingenious mechanical devices, many will regain the use of their arms and legs. Few will remain paralyzed, although until recently the disease was regarded as permanently crippling.

In cold statistics, charted from hospital records, looms large the advances in knowledge made since the last epidemic. More cases recognized in time to give serum; few cripples, fewer deaths—that is the brilliant story of medical progress. Meanwhile, from study of monkeys inoculated with the mysterious virus, the experimenters are coming ever nearer the secret of the disease. Although no germ has been found, a vaccine has been developed that may prove a positive cure.

Upon a score or more of centers in different parts of the globe, medical science has recently focused its attention and rushed its field experts to study dangerous diseases in their most virulent form. In Chicago, for instance, tiny amœbas, spread by unclean hands of workers in restaurants and hotel cafes, disseminated a form of dysentery among guests, resulting in more than 100 cases with fifteen deaths before investigators with test tube and microscope tracked the minute parasites to their breeding grounds.

From all parts of the world, reports of disease flow into the central offices of the public health service at Washington. In this way, the service keeps its finger constantly on the pulse of public health. Aided by cooperating local agencies, its experts can not only detect epidemics before they run wild, but can often predict them in advance.

Meanwhile, the greatest mystery of all remains unsolved. Why do epidemics suddenly flare up and spread like wildfire over the earth, then as suddenly die away? Do races of disease germs, like races of men, rise to a peak of activity and power,

(Continued to page 122A)

Homemade Stringed Instrument Fashioned from Kerosene Tin; It Produces Unusual Tones

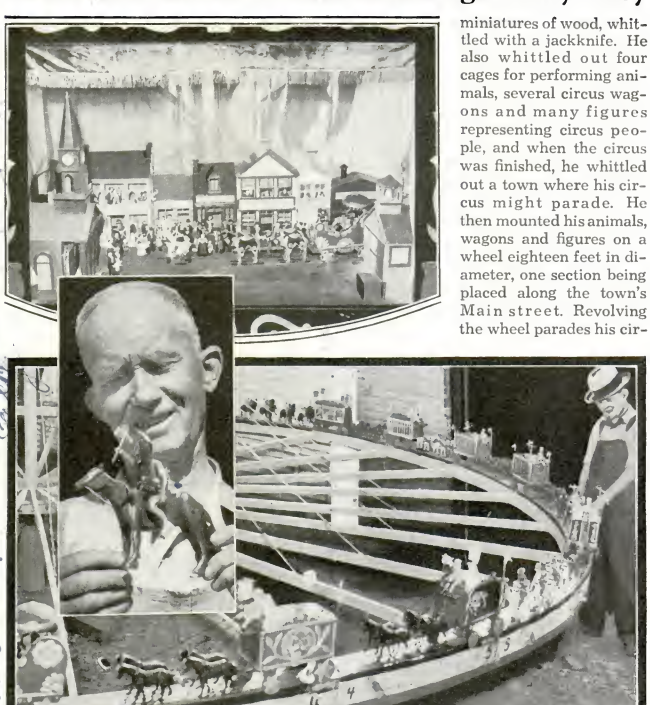
TUNES FROM A KEROSENE CAN CHARM INDO-CHINA TOURIST

Wailing tunes from an instrument fashioned from a kerosene can charm the tourist in Indo-China. The strange instrument, played by a street beggar, produces unusual tones, accepted as musical by natives of that land but perhaps a bit difficult for the Occidental ear. However, the homemade instrument enables its owner to make a living, its odd appearance attracting the eye of passers-by.

SELF-CENTERING GAUGE GIVES INSIDE MEASUREMENTS

To overcome the difficulties of setting a gauge exactly to the diameter of a bore or hole, a self-centering gauge with an outside dial indicator has been developed for making inside measurements. In taking a measurement it is only necessary to move the instrument like a pendulum along the axis of the bore. A spring centers one end of the gauge against the wall of the bore and the dial shows any difference in the bore within one-thousandth of an inch.

Miniature Circus Parades through Tiny City



Miniature Circus Carved of Wood and Placed on Revolving Wheel Which Enables It to Parade through the Tiny Town Shown at Top; the Builder, Inset, Spent Five Years Constructing It

After five years of tedious work, a California man with an absorbing passion for the circus has succeeded in owning one of his own. The jungle where this man trapped his animals, however, was a garage in the back yard of his home and the lions, tigers, elephants and other beasts, including more than 100 horses, are all miniatures of wood, whittled with a jackknife. He also whittled out four cages for performing animals, several circus wagons and many figures representing circus people, and when the circus was finished, he whittled out a town where his circus might parade. He then mounted his animals, wagons and figures on a wheel eighteen feet in diameter, one section being placed along the town's Main street. Revolving the wheel parades his circus through the town. As each unit enters, a mechanism animates the animals and figures so the lions and tigers pace back and forth in their cages, the horses move up and down and the clowns go through their antics. A phonograph plays march music as the parade moves and the man behind the scene gives the animals voice.

Tiny Engine in Midget Craft Tows Rowboat

Powered by a quarter-horsepower motor, a midget boat constructed in Oregon is capable of towing larger craft, including ordinary-size rowboats. The tiny power boat is guided in the manner of a team of horses, by means of lines attached to the boat being towed. It weighs only twenty-five pounds, small enough to carry easily.

Low-Power Boat Pulling Larger Craft with Two Persons Aboard

HOMEMADE GOLD WASHER RUN BY GAS ENGINE

Mechanical washers are enabling the modern gold miner to operate at a profit on ground that the pioneers were unable to handle. The washers eliminate the slow process of hand panning in districts where water is not plentiful enough to use a sluice box. One homemade washer, with a high rate of efficiency in recovering gold, has been constructed in the west. Economical to operate, it consists of a box-like angle iron frame bolted to two six-by-six timbers. There also is an inner frame. A sand and gravel chute leads to the upper end of the top riffle pan. The two riffle pans have opposite pitches, the lower pan emptying into the tailing flume. Two eccentrics are keyed to a shaft mounted on the outer frame, while two pistons with connecting rods are bolted to the inner frame. The connecting-rod bearings are fitted to the eccentrics on the shaft, with a small gas engine connected to the shaft by means of a V-belt. A centrifugal pump is bolted to the engine. When the engine is started, the washer shakes with the same motion used in hand panning. Daily capacity is about twenty yards.

Mechanical Gold Washer Loaded on Trailer

The MILLIONTH

IF you took a four-inch steel bar, one-fourth of an inch square, a fly's weight at one end would bend it the millionth part of an inch.

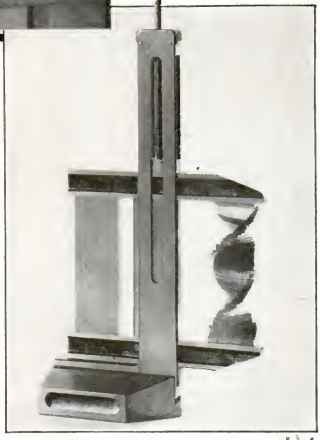
Or, if it were possible to split a human hair 15,000 times, the result would be a one-millionth part of an inch.

While it is difficult for the human mind to grasp such measurements of near infinitude, they have been achieved by Carl Edward Johansson, the most accurate man in the world.

This celebrated Swedish scientist is associated with Henry Ford in producing the gauge-block system which has been accepted as the world standard of length measurement. Without his discovery, a practical high-precision method mass production could not have been achieved.

Nothing in common experience approximates the "feel" of the gauge blocks. They are of hardened steel, the average size about that of a domino. They are made in series so that any measurement, in steps of ten-thousandths, can be achieved by combining two or more blocks, placing them edge to edge. These measurements are accurate to within two one-millionth parts of an inch. They are used to establish standard sizes and for checking precision instruments.

Mr. Johansson has a small hand clamp with jaws adjustable by screws. To test a master block for



Mr. Johansson Demonstrating Accuracy of His Gauge Blocks; Below, Seventy-Six Gauge Blocks Stacked between Jaws of Testing Device Set at Four Inches

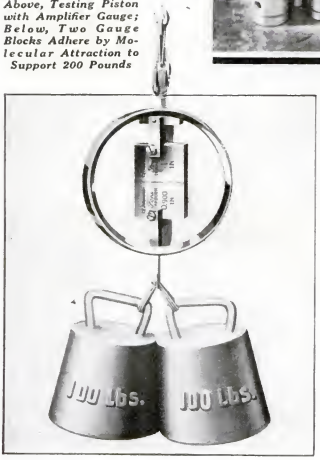
Johansson Mfr.
Ford Motor Co,
Dearborn, Mich.

D/210.

PART of an INCH

accuracy the jaws are set and the block inserted between them. If the block slides in firmly the smooth sensation at the finger tips will tell how nearly accurate it is. If the block happens to be infinitely oversize or even a millionth or two scant, the difference can be felt, so finely honed and true are all contacting surfaces. Even a novice can tell the difference between a perfect block and one that is off size.

The sensation is one of rare, silky smoothness. It is yielding yet has a stubbornness that is almost human; absolutely without play but not binding in the minutest degree. A block held between the testing jaws responds to the slightest touch, but it refuses to be suddenly forced. The impression may be at the same time one of downy softness and diamond hardness. It is all an amazing assortment of contrary forces.

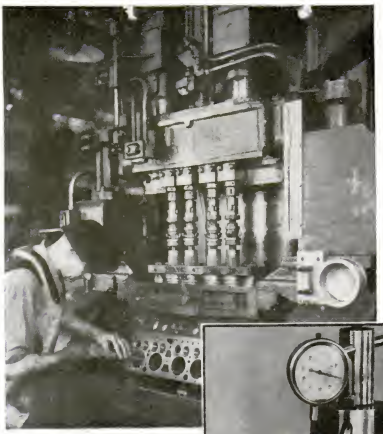


Above, Testing Piston with Amplifier Gauge; Below, Two Gauge Blocks Adhere by Molecular Attraction to Support 200 Pounds

The surfaces of the blocks have the appearance of burnished silver. They have been honed down to such a degree of perfection that if slid one on another with a slight inward pressure they will take hold as if magnetized. In a demonstration two blocks sustained a weight of 200 pounds. Atmospheric pressure, capillary power and molecular attraction are given as probable causes of this amazing adhesion.

Even more impressing, to the novice, is the test by which a defect of one-millionth of an inch in a gauge block can be discerned by the naked eye. For this test Mr. Johansson has a plain glass disk about

D1210

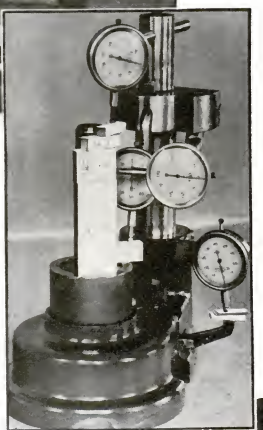


one and one-half inches in diameter. It is slightly prismatic, being, like a wedge, thicker at one edge than at the opposite edge. The surfaces are flat to perfection. When the glass disk is placed flatwise on a gauge block any defect, even though it be infinitely beyond the power of human sight, is detected at once.

Johansson has made it possible for American industry to do away with any need for adopting the metric system, a thing that has been advocated for many years. On the other hand it will never be necessary for European manufacturers, using the meter as a standard of measurement, to learn the inch system. By the use of Johansson gauge blocks, which have been adopted as standard by many countries, manufacturers in any part of the world can work at ease either in inches or millimeters. To make this possible there has been, in recent months, a universal acceptance of 25.4 as the conversion ratio between the millimeter and inch.

The story of this achievement is one of romance as well as of mastery. In the early eighties Johansson, a Swedish immigrant, was a lumberjack in the northern wilds. With his earnings in the woods he entered Gustavus Adolphus College at St. Peters, Minn. Later he returned to his native Sweden and began his long climb to the unique place which he alone occupies, coming back to the United States in 1923. His method of making the gauges is a closely guarded secret.

Johansson, who has reached his full three score and ten has given the world a new science, some of the physical phenomena of which are not yet understood. In perfecting the gauge block he has solved four important metallurgical problems—first, flat surfaces in steel, an objective long sought; second, perfect parallel surfaces in steel; third, accuracy as to dimensions in steel, and fourth, the effective heat treatment and seasoning of steel.



Above, Even the Heaviest Machinery Is Adjusted to a Fraction of an Inch; Center, Amplifier Gauge; Below, Gauge Blocks so Perfect They Adhere to Each Other

Animal and Bird Figures Made from Gourds

Examples of Caricatured Figures Made from Dried Gourds, Balsa Wood and Glue; the Little Girl Is Holding Gourds Which, Before Drying, Weighed Several Pounds

Gourds, the inedible relatives of pumpkins and squashes, are paying dividends to a New Jersey man who conceived the idea of utilizing their peculiar shapes and colorings to model caricatures of birds, animals and other objects. Gourds can be grown almost anywhere but it is difficult to predict the shapes, colors and sizes one vine will produce. They range in weight from a few ounces to several pounds when green and the shapes vary from spheres to grotesque calabashes with large egg-shaped bottoms and long thin necks. Occasionally the shape of a gourd can be controlled during growth by tying it. The choice of subject to be designed is governed by the shape of the gourd. A round one with a slight rise in the center may suggest a lamp base while the variations of the calabash shape can be made into birds and animals. Sometimes two or three are combined into a single subject. The gourd is first dried to a hard shell which is strong and almost as light as a feather. A knife, some white shellac and a paint brush are the simple tools required. The surface is scraped and brushed over with shellac, then the work of fashioning a bowl, a ladle, a penguin, dish or toy is started. Balsa wood is used to add features which nature omitted, this being attached with plastic wood or glue, after which the gourd is colored as desired. To become workable, gourds must be left in a dry, warm place for several months.

LIQUID COATING SAVES GLASS FROM DETERIORATION

Glass articles in museums and elsewhere can be protected from the deterioration caused by the chemical action of gases in the air by applying a liquid preservative coating recently developed. Such protection is imperative for "soft" glass like Venetian ware and other forms having a low silicic acid content. Such glass is particularly susceptible to "glass blight" although plate glass such as is used for show cases in the city where the air is impure is also greatly benefited by the protective coating, it is claimed.

RADIO TUBE

Left, Hidden Basement Where Old Tubes Were "Rejuvenated" and Placed in New Cartons; Below, Old and New Type of Carton; and Polishing Old Tubes Preparatory to Packing in New Containers; the Man with the Scowl Is Trying Out His Set after Installing Rejuvenated Tubes Bought at a "Bargain"

RIGHT under your nose the racketeers are at it again! This time they are selling cast-off, worn-out, and run-down radio tubes with faked guarantees and in bootlegged cartons.

When dead radio tubes show life in the testing meter under your eyes—that's a racket. When used tubes are disguised as new and sold in new-appearing cartons bearing the brand names of reputable manufacturers—that's fraud. When quack doctors claim the power to rejuvenate used tubes—that's hokum pure and simple.

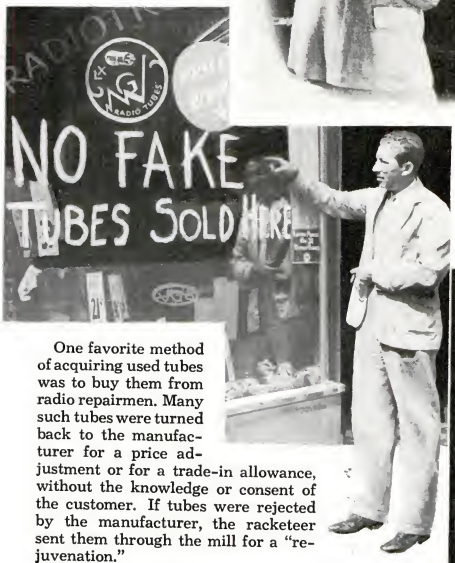
Those are the characteristic earmarks of a racket that has cost the public millions in money and caused much bad temper among radio listeners. The trouble with many so-called "new" tubes is that they are secondhand.

Now the lid's off! A nation-wide investigation by a small army of secret operatives has exposed the inner workings of the racket. Backed by one of the foremost manufacturers in the radio industry, detectives have shadowed the racketeers to all their haunts. They have pursued them

D1138.

RACKET *Exposed*

to hideaway shops. They have seen utterly worthless tubes meter-tested to the satisfaction of customers. They have observed the disposing of run-down tubes to "fences." They have followed itinerant peddlers who make a business of collecting cast-off tubes. They have met the tube racketeers across counters and tables. They have seen radio "clinics" where worn-out tubes are "rejuvenated."



Above, a Set with Even a Little Life Left Will Test Up on a Meter; Left, One Dealer's Method of Fighting Radio Tube Racketeers; Below, the Cheating Dealer Places Old Tubes Left by Customers in New Open-Flap Cartons

One favorite method of acquiring used tubes was to buy them from radio repairmen. Many such tubes were turned back to the manufacturer for a price adjustment or for a trade-in allowance, without the knowledge or consent of the customer. If tubes were rejected by the manufacturer, the racketeer sent them through the mill for a "rejuvenation."

Radio tube rejuvenation is a sort of

Left, Radio Service Man Explaining Why "Rejuvenated" Tubes Were Not Bargains; Below, How a Tube Racketeer Conducts His Business and Some "Bargain" Offers

hocus-pocus by which a knave pretends to have the power to make old tubes perform like new ones. The secret of his black magic is to give the tube a high-voltage shock, which in some cases makes the tube behave properly for an additional short period.

As applied to types like the 01A, '99, '20, '22, and other thoriated filament types, the process, if properly handled, is fairly successful. However, the high voltage employed often results in a complete burnout of the filament. So-called a.c. tubes use different material for filaments and cathodes, and the "hot shot" may bring on many ills to tubes of this general class, although they may be made to give high readings on a brief test.

Of course, meters don't lie—until they become the tools of racketeers. Then the meter needles merely point to the racketeer's cleverness and the customer's gullibility. To complete the process of rejuvenation the racketeer polished the exterior of the tube and placed it in a carton or container bearing the stamp of some

reliable manufacturer. The next step was to market the tubes. They were sold directly to some underground distributor or to a radio dealer. Then the stock was ready for Mr. Public.

The dealer who advertises licensed and guaranteed radio tubes for sale at ten, fifteen, and twenty-five cents, or even the full price, may or may not be aware that he is bluffing the public. But when a dealer advertises that all old and weak tubes can be cured of static and "rheumatism" while you wait—for ten cents each—he knows that he is bluffing.

The truth is this: Not a dealer in the United States can afford to sell first-class tubes at sixty to seventy per cent discount without taking a severe loss.

Tube guarantees vary with the individual manufacturer. However, as a rule, reputable manufacturers guarantee their products against defects in materials and workmanship. They then endeavor to allow a reasonable period within which the tube can be returned for adjustment if it fails to give normal service, when not abused. While there is no arbitrary time limit for turning back defective tubes, ordinarily they will not be replaced later than a year after manufacture.

When the manufacturer's service station receives defective tubes, they are tested and replacement is made. The defective tubes are immediately crushed, to make them absolutely useless. How can Mr. Public defeat the tube racketeer? When the time comes to buy new tubes for your radio—do these three things.

Buy tubes made by a reputable manufacturer.

Don't give away old tubes. If the dealer or service man doesn't break them up in your presence, break them up yourself.

Patronize only reputable dealers and service men.

FOLDING DRY GOLD WASHER SPEEDS PLACER MINING

Placer gold mining can be speeded up by using a collapsible dry washer weighing only seventeen pounds, and thus easily carried to new diggings. The ore is dumped into a hopper and passes over a fine mesh screen which is vibrated by an eccentric gear at a rate of 125 times per minute. In this manner a ton and one-half of dirt can be handled in eight hours. In addition to the coarser tailings, the finer ore, containing the "flower" gold, drops through the mesh and into the miner's pan. Fifty per cent profit is lost ordinarily by failure to recover this flower gold.

Collapsible Dry Gold Washer Which Is Capable of Handling One and One-Half Tons of Dirt per Day

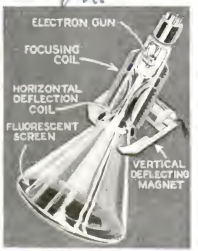
REFLECTOR PLATE FOR AUTOS MAY CARRY ADVERTISING

Metal plates with small reflector jewels are being made in several shapes for attachment to the automobile, as a means of advertising, to designate membership in an automobile club or for some other purpose. One of the plates has a round glass red reflector with embossed aluminum background and red glass front on which the design of the advertiser or the auto club emblem is reproduced. The designs are made by using silk screen stencils.

Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be furnished by our Bureau of Information upon request, accompanied by postage.

D1132. Television Laboratories, Inc. 1276 Mermaid Lane. Germantown, Philadelphia Pa.

New Television System Uses 'Magnetic Lens'



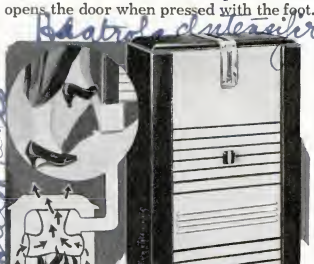
Taking Picture with Special Television Camera, the Receiving Tube and Image as Received

Television for the home has been brought a step nearer by the development of a system of sending and receiving pictures which eliminates mechanical scanning. This system, devised by Philo T. Farnsworth, uses a "magnetic lens" instead of a mechanical scanner. This is made possible because an electronic image can be bent magnetically although an optical image cannot. This system includes a taking camera fitted with a lens and what is known as a dissector multiplier tube on the end of which the optical image is focused. This image is transformed into an electron image which is in focus at two ends of the tube. At one end of the tube is a scanning aperture which allows one part of the electron image to pass out to an amplifier, and then to the radio or wire. By means of the magnetic lens or deflector coil, the electron image is moved up and down, the upward movement being more rapid than the downward motion. At the same time there is a rapid backward and forward movement. The receiving tube is fitted with an electron gun which bombards a fluorescent screen at the end of the tube. Ordinarily the electronic impulses from the gun would bombard one spot but the tube is fitted with deflection coils synchronized with those on the dissector tube in the camera. Thus the electron stream in the bombardment moves with the electron image in the receiving tube, the impulses actuating the deflecting coils being sent out between the electronic impulses carrying the image. Broadcasting is over a band of from three to seven meters, thus

limiting the radius to about seventy-five miles and necessitating relay stations. By using a special motion-picture projector and the dissector multiplier camera, movies can be transmitted by television with this system.

FOUR KINDS OF FUEL BURNED IN COMPACT ROOM HEATER

Coal, wood, oil or gas can be burned in a compact heater shaped like a radio or refrigerator and intended for homes without central heating plants. Through the use of a patented air duct, little heat is allowed to escape up the chimney and hence less fuel is required to heat a given area. Secondary heat from the ash box and fire pot is directed downward through the slanting sides of louver openings to keep the floors warm. The stove is equipped with a large vapor tank for humidifying the air and also has a pedal which opens the door when pressed with the foot.



Compact and Efficient Room Heater in Which Coal, Wood, Oil or Gas Can Be Used as Fuel

Showing Powerful Oil-Well Magnet Supporting Combined Weight of Three Men; It Is Used for Recovering Tools from Bottom of Well

MAGNET FISHES FOR TOOLS LOST IN OIL WELLS

Among the most successful ways of fishing for tools lost at the bottom of an oil well a mile and a half deep is a powerful electric magnet which is lowered into the hole. When contact can be made, the magnet lifts them quickly to the surface. Broken bits, tubing catchers, spearheads, slips, baller bottoms, and various other metal parts are lost in drilling or later operations and must be recovered or the hole deviated around them. The bigger the hole the larger the magnet that can be used with a consequent greater lifting power. Magnets are constructed from three and one-half to twenty-four inches in diameter. A nine-inch magnet has a lifting power of 1,500 pounds plate stock. The apparatus is installed in a truck on which is mounted the cable drum. Tools have been recovered from a depth of 8,250 feet.

They HAVE NOT

© A. & P. Photos

Above, a Boatload of Survivors of the "Vestris" as They Neared Rescue Ship; Below, the "Vestris" Just Before She Went Down

ALTHOUGH the mystery surrounding the fire aboard the "Morro Castle," which caused the loss of 132 lives, may never be solved, greater safety at sea will be one of the results.

Almost every development toward safety at sea has been brought about by public opinion shocked into action by a terrible disaster. A century ago, when coastwise and river traffic was practically our only means of convenient transportation, boiler explosions, fires and other ship disasters were an almost weekly occurrence. As a result, the United States Steamboat Inspection Service was hurriedly organized to inspect ships and during the next two years not a single important mishap occurred.

Immediately following the Civil War the rapid development of the west caused a demand for greater speed. Engineers of river steamers tried to meet this demand by tying down their safety valves, and an epidemic of disastrous boiler explosions

Capt. Robert W. Gordon c/o The Infantry Journal, 1115-17th St. N.W. Washington D.C.

D1209

DIED *in* VAIN

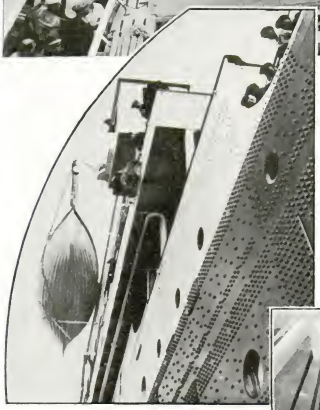
followed. In 1871 the steamboat inspectors were given police powers and the dangerous practice was abandoned.

On June 15, 1904, the "General Slocum" burned near New York with the loss of 945 passengers, most of them children. The investigation showed the ship was a mere shell of highly combustible wood; that the mate was unlicensed; that many of the life preservers contained iron blocks to give them the required weight; that the captain made no effort to fight the fire or aid the passengers and that the crew had never been drilled in their duties in case of fire.

Out of this disaster grew laws requiring construction less susceptible to rapid burning, the securing of lifeboats so they could be quickly launched and fire hose that would stand 100 pounds pressure per square inch and would not deteriorate between inspections. The hose and couplings also had to be of uniform size, and the presence of defective hose on board was

Above, the Hulk of the "Morro Castle" after the Fire Had Spent Its Fury; Below, Fire Doors Like This on the "Morro Castle" Were Not Used

D1209

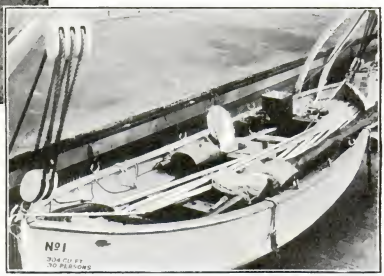


plunged to the bottom two and one-half hours later. The discipline of crew and passengers was perfect. There was no panic, and the boats were filled almost exclusively with women and children and lowered without mishap.

Believing her unsinkable, the owners had equipped the "Titanic" with only sixteen lifeboats, although she was designed to carry forty-eight—more than enough to save everybody aboard, and there was ample time to take off all hands if enough

prohibited. Also life preservers for each person on board were required.

Near midnight of April 14, 1912, the "Titanic," then the world's largest ship, struck an iceberg in the north Atlantic on her maiden voyage. The sea was absolutely calm and the steamer "Californian" was within sight, yet out of 2,201 persons aboard, 1,517 were drowned when the palatial liner



Above, Inspecting Lifeboats and Gear on Liner; Below, Properly Equipped Lifeboat and the "Titanic" Just Before She Sailed on Her Ill-Fated Voyage

equipment had been provided. The "Californian" could easily have proceeded to the "Titanic's" assistance, but the only wireless operator on that liner had retired fifteen minutes before the "Titanic" struck.

The shock of this disaster so aroused public opinion that an international safety conference was called immediately, and from this have come many of the most sweeping reforms at sea. The international ice patrol was organized to patrol the north Atlantic during the ice season, reporting the location of ice so that vessels could be routed safely. No ship has collided with an iceberg since the patrol was organized.

Regulations were also passed requiring vessels to carry enough lifeboats to accommodate all on board. First-class passenger ships were required to carry wireless and enough operators for a continuous watch, while all other ships carrying more than fifty persons on the high seas were required to carry radio and at least one operator.

On November 12, 1928, the British ship, "Vestris," foundered 200 miles off the Virginia coast with 325 persons aboard, and 110 were lost. The day before a heavy gale, blowing from the east, caused the ship to list five degrees. When an extremely heavy sea caused her to roll violently some of the cargo shifted and a permanent list of ten degrees was acquired. Finally, a heavy sea rolled her almost on her beam ends. Water was shipped through the scuppers and found its way to the bunkers, saturating the slack coal and causing a further list. Water now began pouring in through the ports faster than it could be pumped out, and the ship foundered nearly twenty-four hours after the list became apparent. Just a short time before it sank a distress signal was sent. Only

(Continued to page 138A)

"MICRO MOVIE" PROJECTOR FITS ANY MICROSCOPE

Designed to fit any microscope, a new projector enables the amateur to produce "micro movies," showing living specimens on a screen. The object under the microscope is projected on a translucent screen through the aid of a powerful light and a condenser. The screen is between the projector and the audience, enabling the operator to face his guests. The projector operates on 110-volt alternating current. By clipping a mounted mirror to the eyepiece tube of the microscope, the image is projected on paper or notebook so that it may be traced accurately.

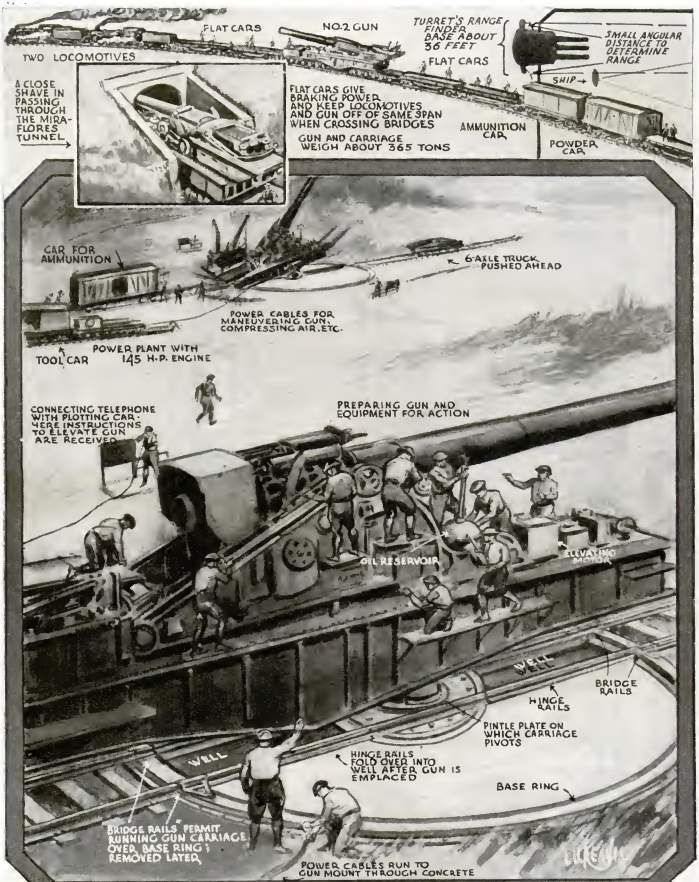
Tracing Microscope Specimen on Paper with Aid of Projector Which Throws Image on Notebook

TIGHTENER FOR RACKET STRINGS GIVES UNIFORM TENSION

Uniform tension is given to all strings of a tennis racket by using a handy tightener for restringing work. It also eliminates distortion of the frame and the difficult hand pulling work. Tension can be adjusted as desired and in use, it is only necessary to observe a sight indicator to insure uniformity. The tightener is aluminum and has only two moving parts.

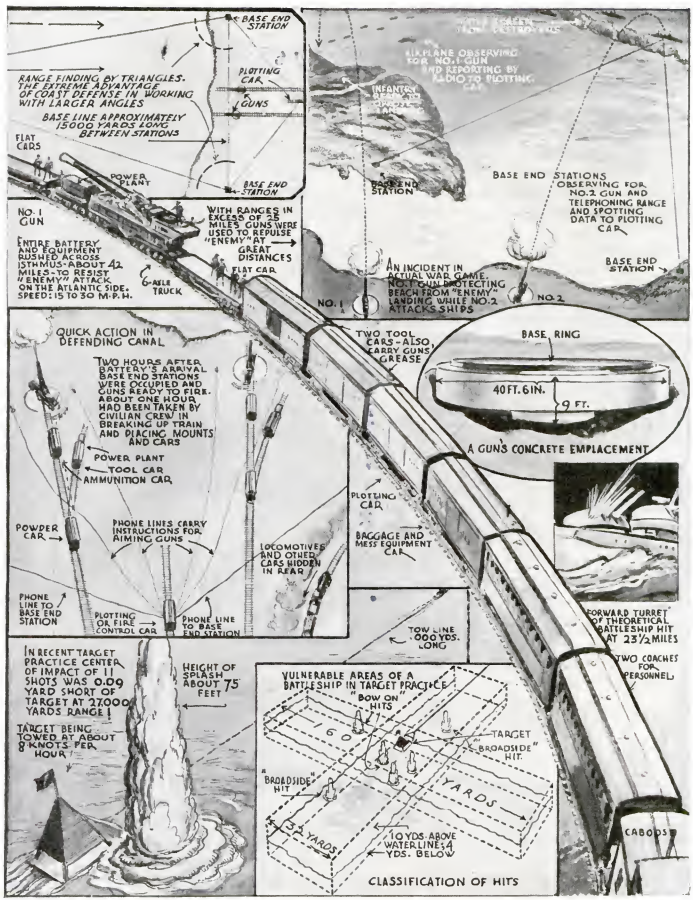
Tennis-String Tightener Which Gives Uniform Tension to Strings without Distorting Frame

Gun-Train Guards Ends of Panama Canal

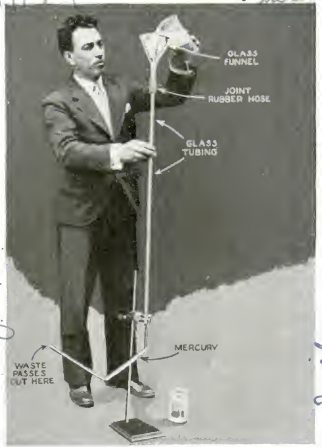


Mounted on a Train for Fast Transportation from the Atlantic to the Pacific Coast, Large-Caliber Guns Guard Both Ends of the Panama Canal; Drawings Show How Big Gun Is Mounted After Trip across Isthmus; Manned by 200 Men, the Rifles Fire from the Rails; Full Turn Permits All-Round Firing

Rolling Fort Crosses Isthmus in Two Hours



Speeding from Coast to Coast, Slightly More Than Forty Miles, in Two Hours, the Fort Mounted on a Train Defies "Enemies" at Either End of the Panama Canal; Drawing Shows Some Essential Steps in Hurling Projectiles Weighing Nearly a Ton; the Gun-Train Has Been Tested in War-Game Maneuvers



This Curved Glass Tube and a Flask of Mercury Make an Efficient Gold Recovery Plant

GOLD RECOVERY PLANT MADE OF MERCURY AND TUBE

Gold can be recovered from very low-grade ore with the aid of a simple apparatus which costs virtually nothing to assemble and operate. This apparatus was devised by Samuel G. Gordon of the Academy of Natural Sciences, Philadelphia, and consists of an ordinary glass laboratory funnel, a length of glass tubing and a small flask of mercury. The funnel is attached to the tubing by means of a rubber hose joint, the tubing being bent at the bottom with the aid of a gas flame. Mercury is poured into the bent portion and the ore is crushed and made into a mud or sludge by adding water. The tube is first filled with water after which the sludge is poured in. The sludge passes through the tube and bubbles through the mercury, the waste passing out the open end. The weight of the mercury is so great that it is not forced out of the tube by the column of water and the mercury retains whatever gold the sludge may contain. Recovering the gold from the mercury is as simple. A potato is hollowed out and the mercury bearing the gold is placed in the hollow. The potato is then roasted and the mercury is driven off, leaving the gold. It is also possible to dissolve off the mercury by using nitric acid.

RECEIVER CHUTE FOR PARCELS SERVES THE CUSTOMER

Early closing hours in many lines of business are bringing a demand for some means of serving the customer before and after the working period. A parcel receiver chute, to be installed in the front door, has been used with success in New Jersey and is being placed on the market. It is intended for tailor shops, cleaning and dyeing plants, laundries and similar places. Parcels dropped into the chute pass through a double shutter that acts as a safety guard, preventing removal from the outside. The shutter also forces the parcel into a container inside the shop. The chute is equipped with a pencil on a chain and a pad on which the name and

Left, Outside of Parcel Chute; Right, Inside View, Showing Receiver for Parcels

address of the customer may be written, together with instructions for handling the parcel. The chute is electrically lighted.

Names and addresses of manufacturers of articles described in this magazine will be furnished by our Bureau of Information upon receipt of return postage.

Arched Water Pipe Spans Unstable Ground

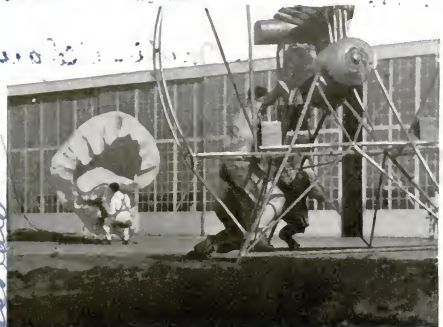
During the construction of a water pipe line to Lausanne, Switzerland, the contractors encountered a serious problem in a large area of unstable ground. So shaky was the soil that a conduit would have been subjected to the danger of breakage. Tunneling under the area was impractical, due to the great depth of the soil. An arched pipe, extending high above the unstable area and capable of a water pressure of 17,000 pounds per square inch, solved the problem.

Showing Great Arched Pipe That Carries Water over Shaky Soil in Switzerland; Compare Its Height to That of Men in Photo

STUMP BURNER USES FORCED DRAFT

Clearing land of trees for cultivation is facilitated with the aid of a forced-draft stump burner consisting essentially of an electric motor or small gasoline engine driving a centrifugal fan in a housing. Through the outer circumference of the housing project twelve nozzles to which pieces of rubber hose are attached. To the end of each piece of hose a four-foot length of gas pipe is fastened. To start a roaring fire in a stump, auger holes are bored around the base, all angling toward the middle. Crankcase oil and gasoline are poured into each hole and this is ignited. Then the end of the gas pipe is inserted in the hole and the blast of air causes the oil to burn rapidly. Soon the oil in each hole is burned but by that time each of the pipes is red hot and the stump is afire and burning toward the center. As the fires from the various angles unite, natural draft is provided and the forced-draft equipment can be moved to the next stump. The forced draft can also be applied to any large roots which remain after a stump is burned to the ground as the burner will also destroy them.

Using a Forced-Draft Burner to Destroy Stumps

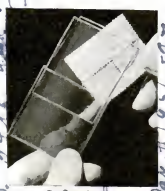


Testing a Parachute Without Leaving the Ground by Allowing It to Open in the Blast of Air from the Propeller Slipstream

PARACHUTE TESTED ON GROUND IN PROPELLER SLIPSTREAM

Students at a California aviation school are required to learn to pack parachutes and they test their efficiency in this work without leaving the ground by opening them in the slipstream created by an airplane engine and propeller. The tester takes a position in the slipstream about fifty feet from the engine and pulls the rip cord on the parachute, at the same time running toward the motor. As the parachute opens he is spun around and pulled along by the big umbrella until guards rush in and collapse it.

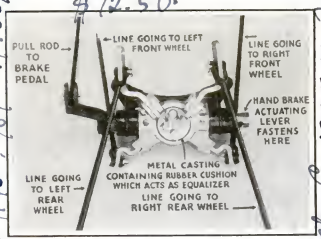
TRANSPARENT STAMP MOUNTS GIVE FULL PROTECTION



Complete protection without sacrificing visibility is afforded by a new transparent mount for stamp collections. The stamps are protected from handling and from sticking to the back of the mount. The mount is made of moisture-proof, non-shrinkable material that will not damage the color of the stamp. It consists of a mount, which contains the stamp, within another mount that may be attached to the collector's book, tray or rack. Thus, stamps may be removed from the outside mount and examined for watermarks or creases without being handled with the fingers or tweezers, the transparent inner mount permitting full visibility.

HYDRAULIC EFFECT GIVEN BY BRAKE EQUALIZER

Live rubber instead of the liquid used in hydraulic brakes is employed as a cushion in a brake equalizing unit for Ford cars. The rubber cushion contained in a metal casting tends to equalize all four brake lines, thus permitting all the brakes to take hold simultaneously. The unit is installed on the cross shaft under the car, near the center where the brake lines meet, and it is unnecessary to cut lines, drill holes or make any changes in the braking mechanism at the wheels.



This Brake Equalizing Unit Uses Live Rubber Instead of Fluid to Insure Uniformity

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information is kept on file and will be furnished by our Bureau of Information upon request, accompanied by stamped, self-addressed envelope.

D1172 - Clark Edward Jarrett, P.O. Varsity Arts. Manitoba Canada

"Mercy Flights" Save Lives in the Far North

Above, Primitive and Modern Means of Travel in Far North; Below, Pilot Dressed for Mercy Flight and Patient Being Taken from Plane after Such a Trip

Airplanes are being used more and more to save lives in the far north where other means of transportation are often too slow or impossible entirely during the winter months. Calls for aid in transporting the sick to doctors and hospitals are received by radio from outlying places and if a plane and pilot are available, they never go unheeded. Most of these "mercy flights" are exactly that and nothing more. The flights are made to save lives without any consideration of pay for the service. In one particularly bad section, all planes but one are withdrawn from service each fall. This one is left for no other reason than to aid the sick and needy. Throughout the winter, the pilot and mechanic sit in their lonely shack awaiting the crackle of the radio to send them on another trip.

D1177 Janesville, Wis

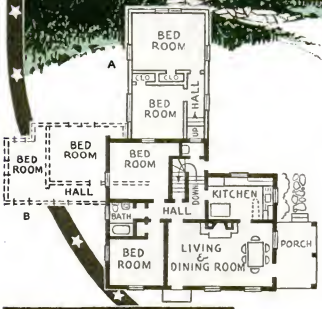
ELECTRIC LIGHTS ON UNIFORMS ADD BRILLIANCE TO PARADE

The 121st field artillery band uses red, white and blue electric lights to add to the pageantry of its night parades. Each bandsman has a red light on his right foot, a blue one on the left and a white light in his cap, current being supplied by small batteries attached to the belt. Separate lights illuminate the bass drum and the drum major's baton.

Organized by Warrant Officer E. J. Starrett

D108 3. Cmb. Arctic Disorders
1145th Inf. Bn. N.G.
c/o The Infantry Journal
Washington, D.C.

Uncle Sam BACKS



UNCLE SAM considers that the home builder is a preferred risk, for he's willing to gamble that he'll pay back any money he borrows to build that dream house, or to brighten up the one he already has.

Uncle Sam isn't going into the banking business. He won't lend you a cent. But he is going to loosen the purse strings of the bankers by telling them that if you don't make your payments he will; and in return for this guaranty, the bankers must treat you as a good risk and let you have the money at a low rate of interest, and give you plenty of time to pay it back.

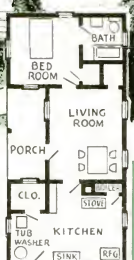
The Federal Housing Administration, one of the newest of the New Deal bureaus, already has a plan working to finance owners in repairing and modernizing their property, and loans of $100 to $2,000 are now available for that purpose. By the first of the year the housing administration expects to have the machinery in operation for granting loans up to $16,000, repayable in monthly installments over a pe-

One of Farm Homes for Which Plans Are Available and Bathroom, Before and After Modernization

Washington D.C. D 1083

HOME *Building*

House Plan, Courtesy Smith and Delps, Architects



riod of twenty years, for new construction. The money now available may be used for maintenance repairs such as painting, roofing, plastering and papering; or alterations to increase the value of the property may be made. Wall board, paint and new windows may provide a needed extra room in the attic or basement, the bathroom may be modernized, the plumbing and heating may be brought up to date, and air conditioning or ventilating fans may be installed. The porch may be enclosed or an extra wing added to the house.

Above, a Three-Room Bungalow Which Can Be Built for About $1,500; Below, Home as It Appeared Before and After It Was Remodeled

Rural as well as urban property may be improved under this finance plan. In addition to the usual repairs around the house, modern water and lighting systems may be installed, poultry houses and barns may be lighted, a silo can be built, and new fences erected or the old ones repaired. Business property may also be brightened up. A new front, providing greater window display space and a more attractive entrance, would draw new customers to a store or increase its rentability. Torn awnings and obsolete lighting fixtures also can be replaced.

These suggestions offer only a

Home of F. P. Schreiber, 51
315 Irene D. Broadhill

Before and After Pictures of Typical Modernization Project for a Shop for Which Loans of from $100 to $2,000 May Be Obtained

bare outline of what may be done. The plan was designed to help owners make any repairs or alterations that will improve any existing building. Structures in slum areas are barred, for another government agency is working on slum eradication. Any property owner with a regular income from any source is eligible for a loan to make these improvements. He may apply at any bank, finance company or building and loan association approved by the housing administration, or to a contractor or building supply dealer.

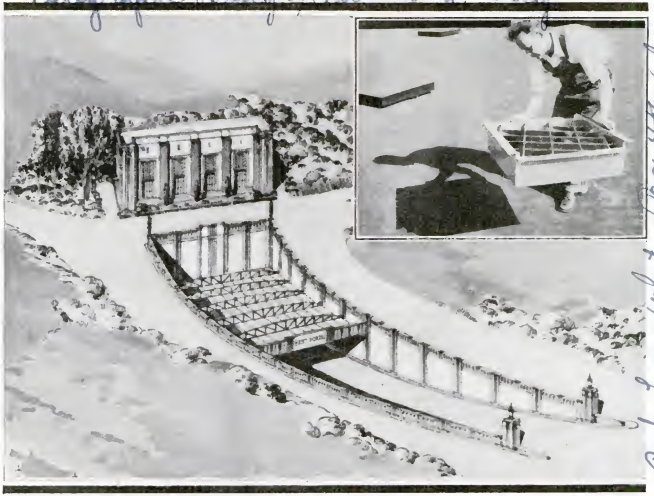
Loans are repayable in any number of monthly installments from one to three years. The annual income of the borrower must be at least five times the annual payments on the note; thus, a person with an income of $2,500 a year could borrow not more than $1,500, for the annual payments on that amount would be $500—one fifth his income. The only security required is an adequate income and a good credit standing in the community. The applicant must give assurance that he owns the property or has a "repairing lease" with at least fifty years to run, that his mortgage, if any, is in good standing, and that there are no past due taxes or liens on the property. He must promise to use the proceeds of the loan solely for property improvement. No cosigners or endorsers are required, except that if the individual is married the signature of the husband or wife must be obtained. The lending agency is not permitted to charge more than five per cent interest, and no extra charges are permitted except a small fine in case of overdue payments.

There are no restrictions on the rights of the owner to use such materials and employ such methods of construction as he may desire, providing they meet the approval of the lending agency and pass the local fire and building laws. The owner may employ any contractor or labor he sees fit, or may do the work himself.

The procedure for borrowing money for new construction promises to be equally

(Continued to page 124A)

Vanes Prevent "Blindness" Entering Tunnel



Canopy over Highway Tunnel Entrance Which Diffuses Light and Enables Motorist to Accustom Himself Gradually to Change of Illumination; Insert Shows Canopy Section and Its Shadow

Temporary blindness experienced by automobile drivers entering tunnels from the bright sunlight will be prevented by light transition structures at entrances of the Broadway low-level tunnel back of Oakland, Calif. Extending 200 feet from the tunnel mouth like an immense canopy, the structure will be suspended from overhead trusses to span the four-lane roadway. It consists of five-inch aluminum strips or vanes, some to run north and south and others east and west. One set will break the rays of the morning and afternoon sun and the other will prevent noonday glare from reaching the motorist's eyes. Vanes are spaced in accordance with the results of hundreds of solar observations. Based on a traffic speed of forty-five miles per hour, the structure extends far enough down the roadway to allow the driver's eyes to become accustomed to the lighting within the tunnel, resulting in safer operation of the car at normal speed. It was found drivers were blinded temporarily if the change from daylight to artificial illumination came too suddenly.

MILLION-POWER LOUD SPEAKER LOUDER THAN THUNDER

Magnification of the human voice one million times is accomplished by a new loud speaker. At full power, the device hurls sound into the air with the force of a fifty-pound hammer. Over flat terrain, in still air, it can project intelligible speech a distance of several miles. It can make the voice louder than a clap of thunder or about 1,000 times louder than the roar at the foot of Niagara Falls. The horn is made of cast aluminum and can be pointed in any direction. The system is controlled entirely by a single push button. The loud speaker, used for the first time at the international yacht races, was designed by engineers of the Western Electric company.

This Chair, Twenty-Five Feet High, Fourteen Feet Wide and Twelve Feet Deep, Helps to Advertise a Florida Furniture Store

GIANT CHAIR ON STORE ROOF ADVERTISES BUSINESS

Twenty-five feet high, fourteen feet wide and twelve feet deep, a giant chair atop a Florida furniture store helps to advertise the business. The chair, an authentic reproduction of an early American ladder-back chair, is of solid cypress.

BOTTLES SEALED IN VACUUM KEEP FRUIT JUICE FRESH

To conserve the natural flavor, aroma and color of fruit juices indefinitely, one manufacturer employs a vacuum packing process and seals the bottles by means of caps containing valves in order to retain the vacuum. The bottles of fruit are placed in a vacuum chamber and heated after which the air is removed with an ordinary vacuum pump, a rather high vacuum being obtained without drawing off the fruit juices. The caps containing tin plate valve seats are then hermetically sealed merely by breaking the vacuum. As a secondary precaution, a spot of solder is applied to the opening in the crown to prevent any filtration of air.

POWER OF GASOLINE MOTOR INCREASED BY BACK PRESSURE

Gasoline engines have not been very efficient because they have been able to utilize only part of the power developed. The explosion of gases in the cylinder gave a push to the piston but the reaction from this push as the piston came back was wasted energy. Now a German inventor has produced a gasoline motor which he claims utilizes this back pressure and which he says is just twice as efficient as the ordinary type of engine. It is claimed this type of engine will not only cut fuel consumption in half when used in automobiles, but is an ideal motor for planes since the weight per horsepower is halved and the cruising radius of such a motor is increased because of the greater power derived from the fuel carried.

This Gasoline Engine, Developed in Germany, Utilizes Back Pressure to Increase Its Efficiency

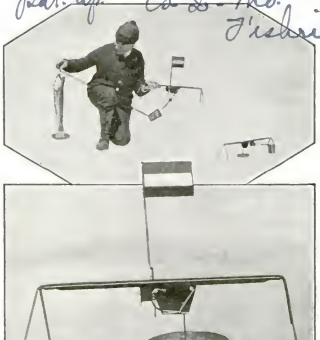
Dynamite "Earthquakes" Aid Study of Earth

Miniature earthquakes, created by setting off small charges of dynamite, are helping scientists study deep-lying rock structures of the earth. Sensitive instruments record the "earthquakes." By studying the effects of these explosions it is possible to locate accurately underlying strata of rock as deep as 40,000 feet below the surface. The apparatus also is used to locate earthquake faults, to study the velocity with which earth tremors are propagated, to locate oil shale and to measure the depth of alluvial deposits. Dynamite charges vary from one to forty pounds. The explosive and recording instruments are carried on a special truck outfitted by scientists of the California Institute of Technology.

Truck and Recording Instruments Used to Reveal Underground Secrets with Aid of Explosives

HANDY TACKLE FOR ICE FISHING IS EASY TO ASSEMBLE

So compact that it can be carried in a pocket or a basket, handy tackle for the ice fisherman is available. The equipment consists of a tip-up machine constructed like a small saw-horse about two feet long, fitted with a flag and the usual fishing line. It is placed over a hole in the ice with live bait attached to the hook. The line is adjusted for the proper depth for the fishing grounds. When a fish takes the bait, the slight pull releases the line from a bobbin, causing the flag to spring into upright position to signal the strike. After the fish is removed, the apparatus may be instantly reset by pushing the flag back to horizontal position and attaching a new bait. For night fishing, a small electric flash lamp may be attached as a signal.



Tackle for Ice Fishing Equipped with a Small Flag Which Springs Upright to Signal a Strike

D 1139. Cmdr. Emile C. Schmierbacher 228 E. 69th St. New York

THEY SHOOT 'EM

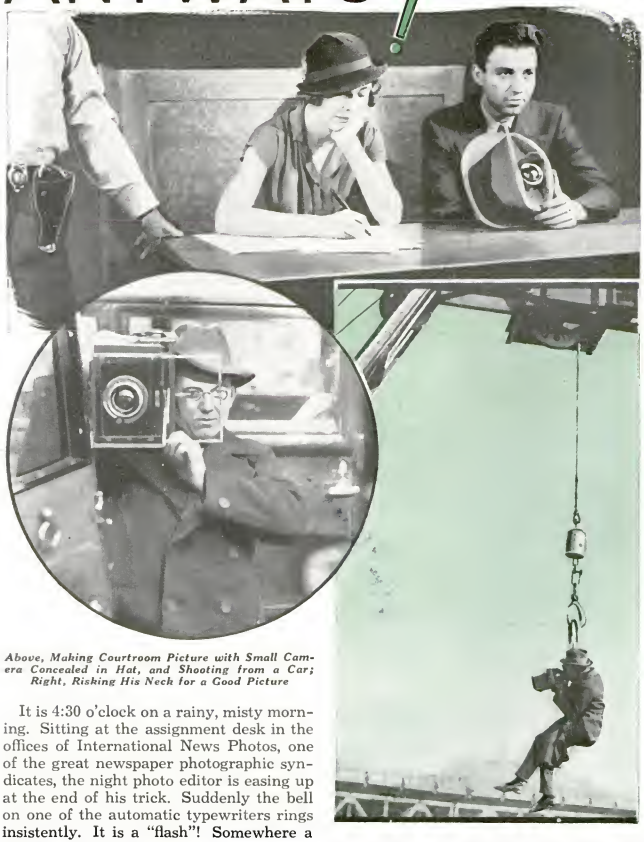
This Newspaper Photographer Is Using a Camera Which Takes Photos in Color, One of the Latest Developments in This Field; Below, the News Photographer Must also Be a Sleuth; This Cameraman Is Shooting Down on His Subject from the Roof of a Building

OF all occupations today, that of newspaper photographer is perhaps the most adventurous. That picture in your daily newspaper of a wounded gangster in a hospital cot was probably obtained by skillful sleuthing as well as actual nerve. That picture of a riot or strike was probably taken at the risk of the photographer's life. Nerve and lots of it, combined with detective ability and a thorough knowledge of photography are the necessary qualifications of the modern newspaper photographer.

"Shoot it anyways"! is the laconic answer which the assignment editor gives when occasionally a news photographer reports it is impossible to get a picture. And, in spite of the apparent impossibility, the photographer generally does "shoot the picture anyways."

D 11'39

ANYWAYS!



Above, Making Courtroom Picture with Small Camera Concealed in Hat, and Shooting from a Car; Right, Risking His Neck for a Good Picture

It is 4:30 o'clock on a rainy, misty morning. Sitting at the assignment desk in the offices of International News Photos, one of the great newspaper photographic syndicates, the night photo editor is easing up at the end of his trick. Suddenly the bell on one of the automatic typewriters rings insistently. It is a "flash"! Somewhere a big news story is breaking!

Pulling the typed sheet out of the machine the photo editor reads at a glance, "Morro Castle sending SOS eight miles east of Asbury Park. Fire." He looks out the window. Rain and mist, a terrible morning for flying. Then he telephones the home of Caveo Sileo, day assignment

© International News Photo

Above, Burning of the "Morro Castle," a Scoop for the Photographer Who Took the Picture; Right, News Cameraman Starting on Assignment and Scene at Le Bourget When Lindbergh Landed

editor. Quickly Sileo calls Mack A. Baron, his aerial photographer. Then Bill Gulick, ace newspaper camera pilot. Both men are ordered to the North Beach airport. Gulick pauses long enough to phone his mechanic at the field. When they arrive the machine is warmed up and on the line.

It is nearly six o'clock and the fog has not lifted. It is raining heavily. Baron has his aerial camera and a smaller one equipped with special hypersensitive plates which may cut through the fog. They climb into the big amphibian followed by the two mechanics. Sileo's orders were to get those pictures and get them quick. They must be in London, Paris, Berlin and in the newspapers of America that very afternoon! Gulick guides the plane down the East river. He gains altitude, trying to rise above the mist. In twenty-five minutes he has passed Sandy Hook and is on a line with Asbury Park. Losing altitude he finds the fog has almost disappeared. It is still raining hard, but Baron has little difficulty locating the smoke of the burning "Morro Castle." Seven minutes later, the ship is being circled at a low altitude while Baron makes a photographic record of the harrowing disaster.

Picture after picture is taken, while Gulick circles and calls out the time every few minutes. Finally he announces "8:30." That is the deadline. There is a mail plane going west at 10:45. The evening newspapers must be on the street at 11:30 a.m. At 11:45 the London office of the news syndicate must have the pictures for distribution throughout England and for re-wiring to the Continent. Newspapers and the air mail must go on schedule. And so the plane heads

for the airport. At 8:58 the big plane taxis up to the hangars. Baron makes for a phone. He says but two words, "Got them"! A fast car is waiting. In fifteen minutes he is in his office and his plates are in the darkroom.

The seconds tick on. It is 9:20 and papers are demanding the pictures. The first wet prints come from the darkroom. Baron has done a good job. The prints must be sent by motorcycle to the local papers. They'll be in the hands of readers by 11:30 a.m. Some must be wired to London, some to San Francisco and some must catch the mail plane for Chicago. Allowing for the difference in time, San Francisco readers will be seeing the pictures a little over four hours after the SOS was sent!

Contrary to the impression created by fiction writers, the newspaper photographers do not resort to unfair tactics in beating their rivals.

"The era of breaking the other fellow's plates passed out about twenty years ago" states Thomas Flanagan, chief photographer for the Sunday (N.Y.) Mirror. "The only way to get a scoop these days is to get a better picture than the other fellow or get it before he does—and you can be sure that he'll get it eventually. Once in a while a photographer gets a better picture by trickery. But he'll get an exclusive picture only by sleuthing as cleverly as a headquarters detective."

The most famous example of "shooting it anyways" was the picture of the execution of Ruth Snyder by a daring Daily News photographer who attended the execution at Sing Sing with a small camera with a powerful lens strapped to his leg and the release cable running up the trouser leg to his pocket. This picture, which shocked the world, was a photographic scoop.

Curiously enough it is not the daring flight, the threatening gunman or the other kindred perils which make it most difficult for the news photographer but the crowd or riot picture. Every riot and crowd scene worthy of a news picture generally results in the smashing of at least one expensive camera.

The news photographer literally must "think on his feet." Only half of his job is to get pictures. The other half is to get

(Continued to page 118A)

Tennis Ball Server Which Enables Player to Practice without a Partner

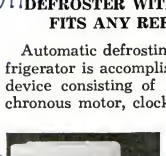
Acme

ROBOT SERVES TENNIS BALLS FOR PLAYER TO STRIKE

Sixty balls are served accurately and mechanically by a tennis robot which propels cuts, slices and drives over a net for the player who wants to improve his stroke. The balls are hit back by the player until the machine is empty.

DEFROSTER WITH TIMING UNIT FITS ANY REFRIGERATOR

Automatic defrosting of any electric refrigerator is accomplished by a defrosting device consisting of a self-starting synchronous motor, clock and a relay which interrupts the flow of current into the refrigerator motor. This interruption of current, adjustable to the size of the refrigerator, is long enough to permit complete defrosting without melting ice cubes or raising the temperature of the refrigerator more than four degrees. The defroster works a pre-determined period of several hours. Defrosting is accomplished without leaving the refrigerator door open.



Big Power Plant on Truck Drills Oil Wells

Top, Giant Power Plant in Operation; Right, Drilling Equipment Driven by the Plant

Developing 250 horsepower and so compact that it can be moved quickly, a new power plant mounted on a truck is designed for drilling oil wells, water wells, lifting or pulling large loads and other heavy duties in farming areas. The plant consists of two motors, of 125 horsepower each, one under the hood of the truck and the other on the truck bed. A special gear synchronizes the motors. Either one or both can furnish the power. Should a breakdown in the truck motor occur on a cross-country trip, a small lever adjustment adapts the other motor to continue the journey. All chains, bearings and gears for the plant may be obtained at any farm implement supply store. Also mounted on the bed of the truck and powered by either or both motors is a large water pump, an electric generator for work lights, a spool of wire line and a hoisting block.

HEAT MADE BY NOISE

Sound waves traveling through the air produce heat, and scientists of the Massachusetts Institute of Technology have developed a sound thermometer to measure the alternating temperatures made by these waves. This thermometer is essentially a very delicate thermocouple comprising thin metal strips of dissimilar metals. Each strip is but one one-hundred-thousandth of a centimeter thick and is mounted on cellulose acetate films of the same thickness. Together film and strip are set on a thin mica frame. The amplifier used to "step up" the tiny electrical current generated at the junction of the two dissimilar strips of metal by the heat of sound is capable of responding to one one-hundred-millionth of a volt. The strips are so delicate that they do not disturb the sound field they are measuring and the apparatus is so sensitive that it is capable not only of recording the minute variations in temperature produced by sound waves but of recording these variations when they are occurring many thousands of times each second.

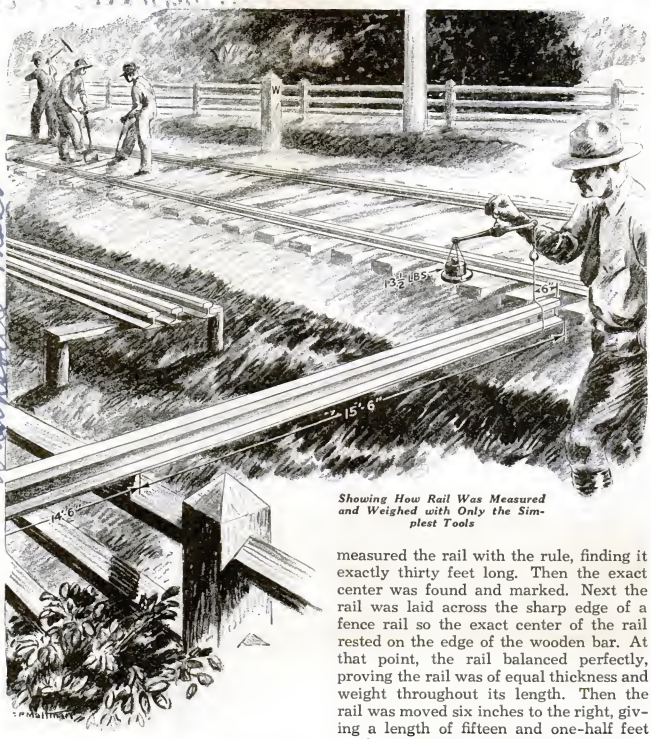
D1179. Cmdr. Julius J. Santa,
2637 N. Crainer, Milwaukee, Wis

Don't Give Up Ship When Your Boat Upsets

If you are not a good swimmer, staying with the boat is the surest way of saving your life. A wooden boat will not sink, even if waterlogged, as these pictures show. In fact a swamped boat can still be rowed and will support several persons clinging to its sides. And rowing a swamped boat is often much safer than attempting a long swim to land. When capsizing occurs, non-swimmers should maintain a hold on the craft and climb to the upper portion as it goes over. Never jump away from an overturning boat if you can't swim. When the craft is righted, it can be reboarded if two persons take positions at opposite ends and on opposite sides. Climb aboard one at a time while a companion keeps the end you are boarding from going under.

What is the surest way of saving yourself when your boat upsets? Most persons instinctively strike out for shore, believing it hopeless to try to right the craft or stay with it. But if it is a wooden boat, and if you are very far from shore or if

Big Steel Rail Weighed One Foot At a Time



Showing How Rail Was Measured and Weighed with Only the Simplest Tools

How to weigh and measure a heavy steel rail without adequate equipment is the problem which an engineer solved in unusual fashion while working on a railroad. The rail was supposed to be about thirty feet long and weigh about 400 pounds. The engineer's only tools for determining the correctness of these figures were a two-foot rule and a pair of balance scales capable of weighing only twenty-five pounds at a time. First, the engineer measured the rail with the rule, finding it exactly thirty feet long. Then the exact center was found and marked. Next the rail was laid across the sharp edge of a fence rail so the exact center of the rail rested on the edge of the wooden bar. At that point, the rail balanced perfectly, proving the rail was of equal thickness and weight throughout its length. Then the rail was moved six inches to the right, giving a length of fifteen and one-half feet on the right side of the fence and fourteen and one-half feet on the left. Six inches from the end of the longer section, the engineer tied a small cord and to this cord he attached the scales. Upon testing, he found it took exactly thirteen and one-half pounds to bring the rail into balance, thus showing the rail weighed thirteen and one-half pounds per foot. Multiplying this weight per pound by the length, thirty feet, the engineer found the total weight was 405 pounds.

D 1162 Demonstrated by Ray McClaren Aviation section Franklin Institute Phila. Pa.

Flow of Air Made Visible for Streamline Tests

Flow of air currents around model airplanes, automobiles, trains and other construction has been made visible. A smoke screen, forced at high pressure over the object under test, is used in producing the visible air flow. Tests indicate that the more streamlined an object, the smoother the air currents flow over it, resulting in increased speed because of reduced wind resistance.

By Using Smoke in the Air Current, as Shown Above, the Effects of Streamlining Are Made Visible in Testing Models in the Laboratory

D 1167

CATTLE DEVELOPED FOR NORTH ARE PART BUFFALO

Farmers of the far north are looking forward to the day when they can have fresh milk and fresh meat during the winter from cattle which, if necessary, can forage on the ranges even in the coldest weather. The Canadian government has started to develop a new strain of cattle hardy enough for the northern settlements and farms. The buffalo has been crossed with domestic cattle to produce this strain and the resulting animals are known as "cattalo." There are about thirty cattalo now in existence. The cross between buffalo sire and domestic cow resulted in too many deaths, and now the experiment is proceeding with the buffalo mating with the yak, and the resultant offspring mating with domestic cattle.

Experimental Station Fair Vaimo Alta. 1146

The Cattalo, Developed to Stand the Far Northern Winters by Crossing Buffalo and Domestic Cattle

HANDY VISE FOR DRILL PRESS HAS BUILT-IN PARALLELS

$12.50 & $7.50 - $12.50

No parallels are needed to true up the piece of work in a drill press vise with built-in parallels. This vise can be used from three sides and V-grooves hold the work straight at all times, making it a simple matter to drill accurate holes in a round shaft. There are three sizes, weighing ten, twenty and thirty-four pounds respectively.

Jos Racine

Racine Wis. Machine Tools

¶Ten years ago the average motorist spent $79.30 annually for tires; now, because of improvements, the average is $14.85.

no data from Chrysler Corp. 1936 Chrysler Bldg. Detroit, Mich.

Portable Gasoline Filling Station Which Can Be Moved by Truck or Rail to a New Location

PORTABLE SERVICE STATIONS SAVE IN CHANGING SITES

Portable gasoline filling stations have been designed to save the oil company's investment when any location loses its value through changes in road routing. Weighing about five tons and built compactly for easy shipment on truck or freight car, the portable station contains air compressor unit, tire racks, tool racks, desks, stove and rest rooms. The structure is insulated against heat and cold by rock wool placed within the steel walls.

CONCRETE AND ASBESTOS PIPE TAKES PLACE OF METAL

Pipe made of asbestos and cement, combined under pressure into a homogeneous structure of extreme density, is replacing metal pipe for certain industrial purposes. The non-metal pipe is chemically inert and immune to the action of ordinary soil acids and alkalies and is unaffected by electrolytic action. It is made in large diameters and long lengths and is used for water transmission and handling corrosive liquids and gases.

LONG POLE TAPS PHONE LINE WHEN TRAIN STALLS

Train crews on railroad branch lines in remote sections are sometimes equipped with a long collapsible bamboo pole which enables the crew to establish contact with division dispatching headquarters in case of engine failure or other emergency. The pole has a "Y" prong at one end by means of which contact is made with an open railroad telephone line. When such contact is established, the conductor is able to talk with his dispatcher through a receiver and transmitter at the lower end of the pole, a wire extending from the telephone set to the prong at the top. This method of communication advises the dispatcher immediately of the location of the train and the nature of the trouble.

Using Collapsible Pole and Telephone to Establish Connection with Railroad Division Offices

Radio Artists Guided by Numbered Carpet

Numbered carpets are being used in radio broadcast stations to designate the positions of singers, chorus and orchestras. The carpets are marked off in numbered squares during rehearsals, with corresponding numbers appearing on the script of each performer. Thus, each artist knows where to stand before the microphone for best results.

© Fox Photos

Numbered Carpet in Radio Broadcasting Studio Which Designates the Positions Each of the Artists and Musicians Must Occupy

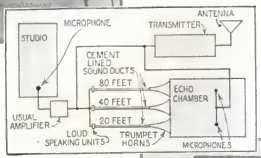
REFRIGERATED VAN IS COOLED BY FUEL THAT RUNS MOTOR

Refrigerated by the same fuel that runs the motor, a two-ton truck has been tested under ordinary operating conditions in Detroit with satisfactory results. A new fuel called Petrogas, which is carried as a liquid at a pressure of 135 pounds in two cylinders containing about twenty-three gallons each, is the secret of the fuel-cooling system. This fuel is converted from a liquid under pressure to a gas, resulting in heat absorption and refrigeration of the truck body, as it passes to the motor. When it reaches the mixing valve and goes into the intake manifold, the fuel has become a dry gas that runs the motor at high efficiency. The elimination of crankcase lubricating oil dilution is claimed, resulting in a large saving on oil. The fuel is marketed at approximately the same price, on a performance basis, as regular gasoline, but it has the added advantage of serving both as fuel and refrigerant. Having an extremely high octane rating, it can be used on high-compression motors. Combustion is almost perfect even in motors of ordinary compression. In tests with the two-ton truck, temperatures in the truck body were held below fifty degrees while outside temperatures ranged as high as ninety-four degrees. The system is said to be adaptable for use in air conditioning of buses and railway trains using internal combustion engines. Engineers believe that it may be a step toward cooling the interior of passenger automobiles.

This Truck Is Cooled in the Process of Converting Its Motor Fuel from a Liquid to a Gas

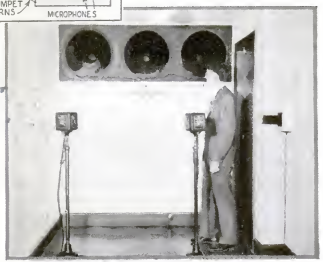
¶One-fifth of all homes in the United States are without kitchen sinks.

Echo Vaults Add to Acoustics of Radio Studio



Pipes Carrying Sound to Echo Vault, a Diagram of Plan and Microphone in One of Vaults

Man-made echoes simulating anything from a political convention to a battle scene in open country can now be produced in any of the studios of the National Broadcasting company in Radio City, N. Y., through the use of echo vaults. By this method the output of a studio fifteen by twenty feet in size can be transformed to the acoustic proportions of a big auditorium. The change can be accomplished by merely turning a dial which has the effect of transforming the studio with its sound-deadened walls into a great acoustic chamber. The idea involves the use of three echo chambers of average room-size proportions located some distance from the studios. When it is desired to simulate a broadcast with echoes or reverberations, the program from the studio is picked up by the microphones in the usual way. This sound is then made to travel to three loud-speaking units located near any vault. Attached to the loud-speaking units are three pipes of varying lengths, all lined with cement. Attached to the other end of these pipes are three long trumpet-like horns mounted in the walls of the echo chambers. The original sound passing through these pipes is obstructed by their unusual length and encounters resistance caused by their cement linings, making a lag in the sound when it is emitted from the trumpet horns in the vault. Here the tile and concrete walls, floor and ceiling make the waves bounce and these reverberations are picked up by two microphones in the vault and conveyed to the regular transmitter where they are broadcast.



Magnetic Plug for Oil Drain Attracts Metal Particles

Three Magnetic Drain Plugs with Metal Particles Trapped from Oil During Long Run

Small particles of metal cut or worn from working parts of the automobile engine or gears are trapped by a magnetic plug made in sizes to fit the drain of crankcase, transmission and differential. The plug, with magnetized core, catches the free metal as it circulates in oil and grease, holding it until the service man wipes the mass of particles from the plug. Then the cleaned plug is screwed back in place to perform the same service repeatedly.

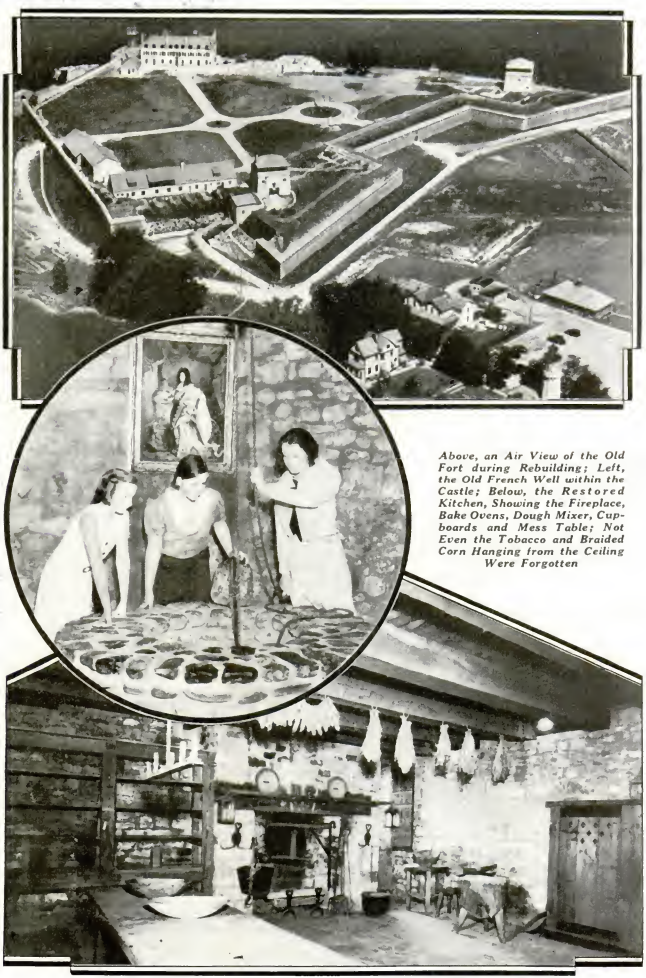
D 1110 Cmh. John Winters Fleming
240 Wallace Ave
Buffalo NY

The FORT of FOUR Nations

OLD Fort Niagara, unique among the famous forts of the world as the cosmopolitan product of four great nations and veteran of three wars has been rebuilt. It stands today atop the lofty triangular bluff below which the Niagara river flows into Lake Ontario, the result of seven years' research through the archives of four governments—French, English, Canadian and the United States—and seven years of reconstructive work.

The fort, restored by the Old Fort Niagara Association at a cost of $500,000 is unique in many respects. Its main structure, the old French castle, built in 1726, is the oldest building west of the Hudson river. Old Fort Niagara is the only regular United States Army post to fly at all times the flags of three nations: the triple fleur de lis of the France of King Louis XIV, the double-crossed Union Jack of the England of King George II, and the fifteen-starred and fifteen-barred flag of the United States of George Washington.

The Hot-Shot Oven at Which Fanny Doyle Worked during the War of 1812 and One of the British Blockhouses Forming Part of Fort Niagara



Above, an Air View of the Old Fort during Rebuilding; Left, the Old French Well within the Castle; Below, the Restored Kitchen, Showing the Fireplace, Bake Ovens, Dough Mixer, Cupboards and Mess Table; Not Even the Tobacco and Braided Corn Hanging from the Ceiling Were Forgotten

The site of sanguinary conflicts intermittently fought for nearly two centuries, a veteran of the French and Indian wars, the American Revolution and the War of 1812, the fort for 118 years past has stood as a symbol of peace along the Canadian-American frontier. The French built the old castle, the drawbridge, gate house, powder magazine and barracks. The British added the bake-house and two block-houses and the United States built the hot-shot oven and laid the brickwork surrounding the casement. It was decided to restore each structure to its own period.

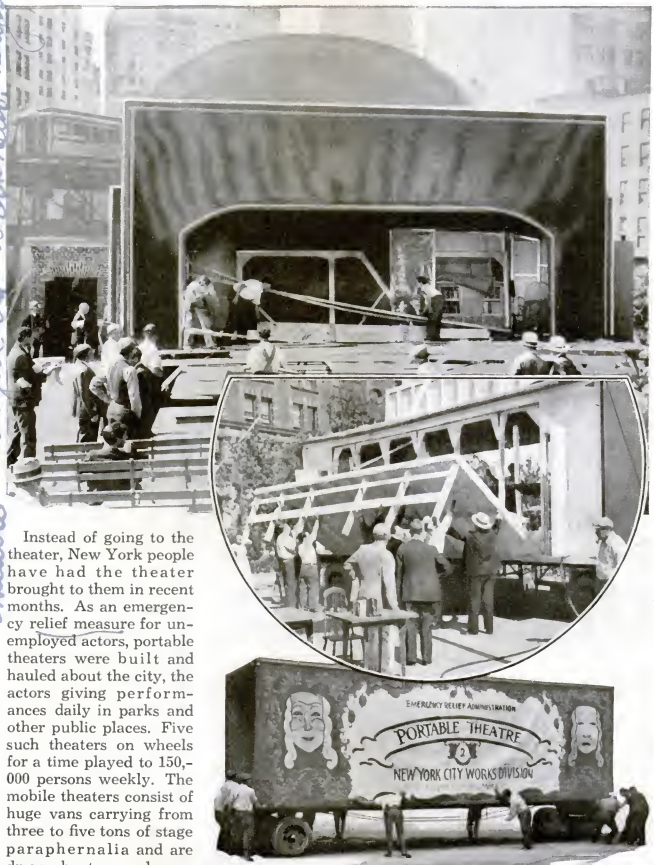
From aging military engineering files of the French, English, Canadian and United States governments were secured copies of the original architectural drawings, plans and specifications of the various buildings. Then architects, antiquarians and historians pored over the assembled plans and drawings to be sure that the reconstructed fort would be authentic.

Most historic of the little group of buildings is the old French castle. In 1720, a Frenchman known as "the mystery man of the Niagara frontier," obtained the consent of the Iroquois Indians to build "a stone house." The structure was far more fortress than house. It had stone walls four feet thick and an interior well as if anticipating a possible siege. Like Quebec, the castle two centuries ago kept guard over "the lower town," a straggling community at the foot of the bluff, later obliterated.

When the British captured the fort in 1759 they plastered it from subterranean dungeons up through to the covered gundeck atop the roof. All this plaster had to be removed. Similarly, fireplaces had been bricked up and had to be uncovered.

Drawbridge and Gate House at Entrance to Fort, a Corner of the Kitchen and a View of the Council Room of the Old French Castle

Theater on Wheels Brings Play to Audience



Instead of going to the theater, New York people have had the theater brought to them in recent months. As an emergency relief measure for unemployed actors, portable theaters were built and hauled about the city, the actors giving performances daily in parks and other public places. Five such theaters on wheels for a time played to 150,000 persons weekly. The mobile theaters consist of huge vans carrying from three to five tons of stage paraphernalia and are drawn by two and one-half ton trucks. The vans are twenty-eight feet long but have "aprons" front

Stage of Portable Theater, Lowering One of Aprons, and the Theater on Wheels Ready to Travel; the Van Carries a Complete Stage and All Necessary Equipment

and rear to increase their length to thirty-two feet when a play is being presented. On them or in them the whole stage is set, scenic drops are hung from a gridiron above, rolled footlights are placed at the front of the stage and a portable switchboard is connected to some near-by power source. Three dynamic microphones and three six-foot trumpets carry the voices of the actors to the crowds massed before the stage in a park or other outdoor setting. Plays requiring more than a score of settings are often presented. A dressing room is created in the back of the van when the rear apron is lowered and the lighting equipment duplicates that of any modern theater with rolled footlights in three colors turning on a hinge, fly lights, border lights, strip lights, flood lights and even baby spots. The switchboard has the dimmers which produce the effects dear to the heart of every stage manager and the theater is manned by a crew of from six to eight men. When ready for a performance the proscenium opening measures twenty-two feet and the van is thirteen feet high and eight and one-half feet wide.

RADIO SET IN PERAMBULATOR ENTERTAINS THE BABY

Music for the Baby Is Supplied by This Perambulator Equipped with a Small Radio Receiver

Music to entertain the baby out for a stroll is always available in a perambulator equipped with a radio set. Dry batteries tucked away in a small compartment supply the power and the set is mounted on the footrest with the speaker pointed downward.

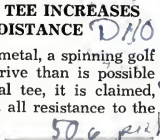
This Old Car Mounted on the Roof of the Garage Draws Business by Attracting Attention

OLD AUTO ON ROOF OF GARAGE ATTRACTS CUSTOMERS

One New York garage owner advertises his business and attracts the attention of passing motorists with the aid of an old car which he has mounted on the roof of his place of business. Motorists can see the car silhouetted against the sky when half a mile from the shop, and its appearance usually arouses their curiosity sufficiently to make them observe the garage closely as they near it.

SPINNING GOLF TEE INCREASES DRIVING DISTANCE

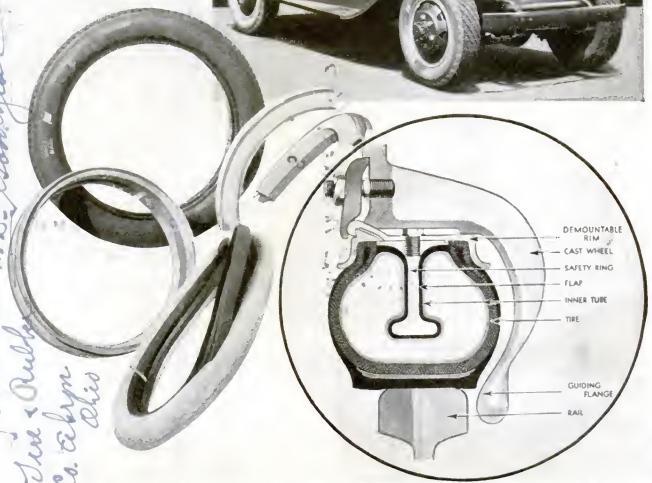
Made of rustproof metal, a spinning golf tee gives a longer drive than is possible with the conventional tee, it is claimed, because it eliminates all resistance to the stroke. It consists of a metal spike and support on which rests a horizontal arm on which the ball is placed. When the ball is struck the arm is revolved by the force of the blow. It is claimed the tee diminishes slicing and it is said to be virtually unbreakable. It folds up for carrying and can be stored in the pocket.



D 1106.

Bullet-Proof Tire Has Sponge Rubber Tube

Automobile tires intended for military purposes and for police cars are now being made bullet-proof with the aid of a sponge rubber inner tube. A regulation casing is used and no air is necessary in the inner tube.



Car Equipped with Semi-Bullet Proof Tires, Assembly of Tire Equipped with Inner Safety Ring, and Cross Section of Such a Tire When Used on Wheel of a Rail Car

As a result such a tire cannot go flat unless it is literally riddled with bullets. The development of various types of rail cars has brought about an increasing use of pneumatic tires for this purpose. Recently there was introduced a pneumatic tire for rail purposes with a safety ring or inner monorail to serve as a support in case of a puncture or blowout. This tire now has been adapted to trucks and passenger vehicles where it is essential to provide for continued operation in the event of a puncture. It is also used on armored cars, scout cars and military vehicles to lessen the danger of interrupted operation. The tire consists of a casing, tube, flap, safety ring, demountable rim and, on the rail cars only, a wheel with a safety flange. The casing is of conventional construction but built of special materials to assure long carcass life. Because of the safety ring or inner monorail the tube is kidney shaped and the flap fits around the safety ring and protects the tube from chafing. The ring or monorail restricts the drop of the vehicle in case of a flat tire to less than one inch, hence a car can continue to run even in the event of a blowout. The safety ring

is of duralumin and due to its strength it is of much smaller cross section than if rubber or wood were used. For this reason it does not materially reduce the air volume of the tire. It also acts as a heat conductor and actually reduces tire temperature, thus increasing the life and carrying capacity of the tire. The ring is made in three sections and fastened to the rim in such a way that there is no danger of shifting, buckling or tipping. When used on rail cars, the tread of the tire is flat and has an angular rib design to aid in driving water and snow from the rails and give traction. For rail cars a guiding flange is provided which continues to operate even in case of a flat tire because the safety ring prevents the flange from striking the fish plates at rail joints or the frogs at switches.

REVOLVING DISK ON WINDSHIELD KEEPS OFF SLEET AND RAIN

Remaining dry in the heaviest sleet, rain or snowstorm, a revolving windshield which can be attached to any car is operated by an electric motor. The motor turns the disk at 1,700 revolutions per minute, this extreme speed setting up an air cushion close to the disk which prevents moisture from touching the glass. It is claimed the disk remains dry by virtue of this resilient film of air, even in severe storms.

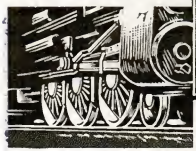
Revolving Disk on Windshield Operated by Electric Motor to Keep Off Rain and Snow

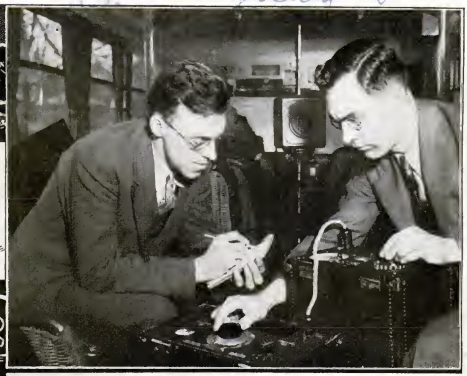
"EASTER BONNETS" FOR DOGS MAKE EARS STAND ERECT

Great Dane Puppy Before, During and After Wearing "Easter Bonnet" to Make Ears Stand Up

When Great Dane puppies reach the age of three or four months, their owners take them to a dog hospital to have part of their ears removed, that is, if the puppies are intended to become show dogs. After this, the puppies are forced to wear an "Easter bonnet," a contrivance designed to shape the ears so that they will stand erect. The bonnet is held to the head with straps and to the ears with adhesive tape. After its removal, the puppies' ears are pulled, twisted, massaged and even taped into little rolls, all for the sake of beauty. The result is a set of trim, upstanding ears on each dog. It seems that dogs in that class have little or no chance of winning prizes at shows unless their ears have been cropped. Many owners regret the practice, but put their dogs through it because of the shows. There are several states in this country which prohibit the cropping of dogs.

¶Four-fifths of the homes in the United States have no electric lights and about three-fifths have no refrigerator.





SOUND

SOUND sleuths have developed a new science—the detection, analysis and measuring of the causes of noise—and have worked out methods of abatement.

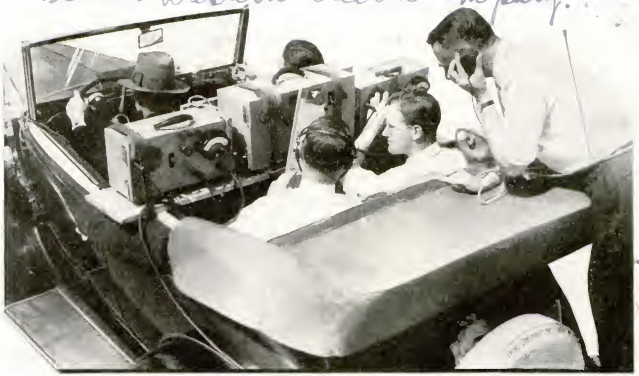
The first step is the discovery of the source of annoying sound, and its measurement in actual figures.

In measurement of sound, the unit is termed a "decibel," on a scale resembling the temperature figures of a thermometer. Zero is the loudness of a sound which the ear could just detect under theoretically perfectly quiet conditions. About fifteen decibels is the lowest noise level which has been obtained in specially insulated rooms, and about fifty decibels is the minimum which is ever obtained on the streets of a large city.

Along with the study of noise has gone experimentation in means of reducing or eliminating it with absorptive and insulative materials. Two laboratories, one in New York City and one in Los Angeles, test various types of materials.

Some Common Sources of Annoying Noises and, Top, Westinghouse Engineers Diagnosing a Noise with Aid of an Analyzer; Below, Using Meter Which Measures the Loudness of a Sound

Electrical Research Products, D1127
250 W. 57th, New York City.
(Subs.) Western Electric Company.



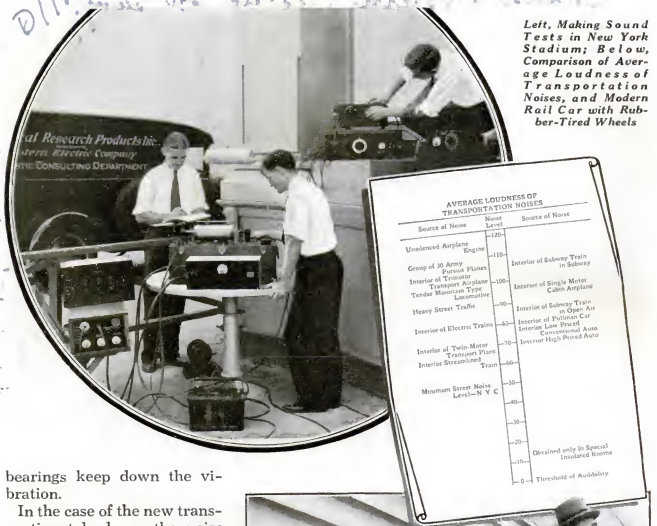
SLEUTHS *Battle Noise*

Above, Sound Engineers Testing Various Gasolines to Determine Relative "Knock"; Below, Rubber-Shod Horse and Rubber-Tired Milk Wagon, and Testing Refrigerator Motors for Noise

Three ways are adopted for lessening noise. Something may be done to abate noise at its source—to stop the cause—or a barrier may be built up between the cause of the noise and those who may be disturbed by it, or materials may be used in such a way as to deaden the sound.

The latest electric refrigerators exemplify methods of abatement of noise at the source. The motor and compressor hang on springs or are set in rubber. The motor, if rigidly set, would so jar the whole structure that the vibration would cause considerable noise, but these resilient

and Westinghouse Electric & Mfg. Co. & Pittsburgh, Pa.



Left, Making Sound Tests in New York Stadium; Below, Comparison of Average Loudness of Transportation Noises, and Modern Rail Car with Rubber-Tired Wheels

bearings keep down the vibration.

In the case of the new transcontinental planes the noise is lessened at the source by having the engines mounted in the wings on rubber, and by the use of the adjustable pitch propeller. Also insulating material cuts off noise from the cabin. The result is that on these planes persons can converse in ordinary tones. Similar means are used to quiet automobiles.

Street noises of all kinds have been measured and their relative degrees in decibels charted. In some cases methods of lessening the noise have been worked out. A very recent application of the scientific study of noise and methods for its abatement has been made by a large milk distributing company. This milk company's horses are shod with rubber shoes, and the wagon wheels are now equipped with pneumatic rubber tires.

Sound engineers also have done much work in buildings and public places along the line of acoustic control and in the abatement of unnecessary noise. With the increasing use of machinery and the growth of cities, this noise nuisance is constantly becoming more menacing, hence the science of noise detection, measurement and abatement to combat it in both offices and homes.

Tractor Guide Saves Labor for the Farmer

Working a farm with a tractor is greatly simplified by using a guide which does most of the work of steering when plowing, drilling grain, listing for corn or cotton or cultivating listed crops. Rows and furrows are made of a uniform width and straighter than is possible when the tractor is steered manually, it is claimed. The operator is left free to watch and adjust his cultivator or other implement instead of giving his attention to steering when the tractor is moving. A lever lift enables the guide to be raised or lowered easily, a rigid push member drives the guide wheels from the rear, thus eliminating side draft, and raising of the guide wheels does not alter the course of the tractor. There is a side hill adjustment, the tractor and guide can be operated near a fence and there is a guide on each side for listing.

Tractor Guide Which Does Most of Work of Steering When Plowing; a Lever Lift Enables the Operator to Raise or Lower It Easily

CARD TABLE MADE OF PAPER FOLDS FOR STORING

Collapsible Card Table Made of Paper; the Parts Are Held Together by Slots and Tongues

Collapsible card tables made of paper are not only light in weight but fold flat for carrying and are particularly suited to take on an outing or camping trip since they are so inexpensive they can be discarded at the end of the trip. The top is supported by four upright pieces of cardboard which forms the legs and the parts are held together by slots and tongues.

FLEXIBLE TAPE RULE TAKES INSIDE MEASUREMENTS

Eight different types of measurements, including inside dimensions, are possible with a flexible steel tape rule contained in a case especially designed for quick scientific methods of measuring. Among its many uses are included inside, outside, height gauge, depth gauge, layout, radius, trammel and flexible measures. In making inside measures, the flat back of the case is placed against one side of an object and the tape is pulled out to touch the opposite side, the reading being taken at the point where the tape disappears into the case. The case is pocket size and has a lever lock to make it possible to retain any measurement for future reference or to take a measurement in the dark.

"Snowflyers" Replace Dogs in Frozen North

Dog Teams in the Far North Replaced with Cars Having Runners and Tractor-Type Wheels

Factory-made for travel in the far North, automobiles with runners at front and tractor-type wheels at rear are being used to transport supplies over the snow. Called "snowflyers," these machines maintain schedules in the coldest weather found in the western Arctic regions, 1,000 miles north of the Coppermine river. One homemade snowmobile of this type carries supplies to the Canadian airways base on the God's Lake run.

Sewage Gas Operates Auto Motor to Make Electricity

At a cost of less than forty cents per week, the sewage plant at Frankfort, Ind., is producing enough electric power to light the plant, run the machinery and light an adjacent fish-hatchery park. This is accomplished by using the gas given off by the sewage to run an old Buick automobile engine connected to a second-hand generator with a capacity of 35,000 watts. Brought in under its own power, the gas is fed into the engine through an ordinary carburetor. The unit is quiet in operation. It has been found possible to adjust the carburetor so the engine starts as well on the sewage gas as on gasoline. An automatic governor admits more fuel as it is needed in varying quantities. The arrangement also supplies sufficient current to heat all the office buildings and the water that they use by means of electric heaters. By applying direct current from this machine to salt, a good grade of chlorine gas is produced for use in the swimming pool operated by the city. Hot water pipes in the sewage reduction tanks speed up the process of reduction, resulting in the production of more gas.

Tank of Sewage from Which Gas Is Obtained to Run Auto Engine; Below, Attached to Generator

ROASTING EARS FOR WINTER KEPT FRESH BY FREEZING

Government agricultural experts have found that sweet corn frozen within four hours after it has been picked retains its original freshness from six months to a year. Freezing stops most of the changes which normally occur rapidly in corn. In the experiments gathering, grading, husking, scalding and cooling for freezing were all completed as rapidly as possible. The scalding, it is believed, temporarily stops the chemical action taking place in the corn and the freezing permanently stops the action so that if served six months later its original freshness is retained.

RISING AND FALLING PRESSURE SHOWN BY BAROMETER

Weather information is given at a glance on a large display barometer with a dial one foot in diameter. A red signal in an aperture at the bottom shows whether the barometric pressure is rising or falling at any time. If the signal shows the pressure is rising, the inner circle forecast to which the dial points is observed, but when the red signal appears in the falling aperture, the outer circle forecast to which the arrow points is read. With this instrument it is unnecessary to make a previous setting in order to read the forecast as has been the case with ordinary barometers.

This Barometer Not Only Indicates the Pressure but Shows Whether It Is Rising or Falling

¶The annual production of buggy whips still exceeds $250,000.

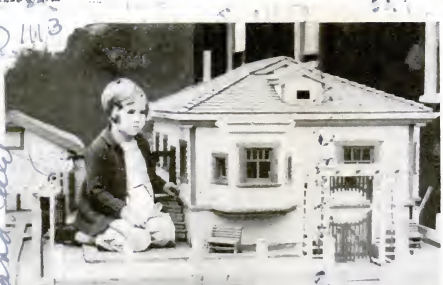
Top, Using New Decorating Tool; Bottom, Rubber "Bristles" for Producing Odd Effects

DECORATING TOOL OF RUBBER APPLIES WALL FINISHES

Decorative finishes may be applied on walls, ceilings, woodwork, furniture and the like with a new rubber brush that is made in several sizes. The tool is said to be handy for doing better and faster work, producing unusual mottles and blends. The blades are made of paint resistant rubber set in rubber.

DOOR CHIMES REPLACE BELL AND ARE EASY TO INSTALL

Door bells can now be replaced with mellow chimes which operate on the door-bell current without extra batteries or transformers. Installation is simple since it is only necessary to disconnect the bell and connect the chimes in its place. The tone of the chimes is more pleasant than the sound of the bell.

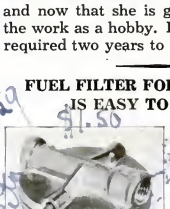


Doll House Complete in Every Detail, Including Electric Lights, Papered Walls and Windows and Doors Which Open and Close

DOLL HOUSE LIKE MODEL HOME TOOK TWO YEARS TO BUILD

One California man spends his spare time building glorified doll houses, not the ordinary kind of cardboard and glue, but real miniature homes complete with electric lights, papered walls, tiled bathroom floors, parquet floors in the living rooms and windows and doors that open and close. The little homes are complete even to cupboards and closets and each has a garage and even a dog kennel. The builder, a mill worker, began constructing the doll homes when his daughter was small, and now that she is grown, he continues the work as a hobby. His latest doll house required two years to construct.

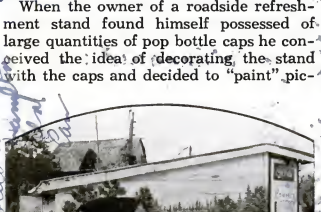
FUEL FILTER FOR SMALL CARS IS EASY TO INSTALL



Trouble with clogged fuel lines is eliminated as is also the danger of carrying water or dirt into the carburetor by using a gasoline filter specially designed for Ford cars but which can also be used in some of the other smaller cars. It consists of a sturdy glass bowl fitted with a metal strainer which will not tarnish or corrode and the necessary connections for installation which requires only a few minutes. The same type of filter is standard equipment on some of the more expensive cars. The filter holds a supply of clean, filtered gasoline, and promotes easier starting since the fuel pump does not drain dry. It also eliminates air or vapor lock, prevents freezing in cold weather by keeping condensation and water out of the fuel pump and enables the pump and carburetor to operate most efficiently. The glass bowl is easily detached.

BOTTLE CAPS ADD ATTRACTION TO ROADSIDE STAND

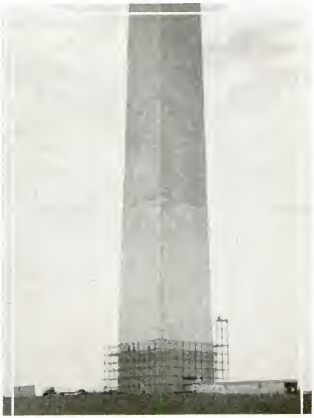
When the owner of a roadside refreshment stand found himself possessed of large quantities of pop bottle caps he conceived the idea of decorating the stand with the caps and decided to "paint" pictures with them. As a result the walls of his stand are covered with scenes composed of thousands of the caps in various colors. Such parts of scenes as could not be depicted by the caps were painted in. He also paved the floor in front of the booth with the caps.



Refreshment Stand Decorated with Scene Made of Pop Bottle Caps and Painted Background

GIANT SCAFFOLD USED TO CLEAN WASHINGTON MONUMENT

When it was decided to spend $100,000 in cleaning and weather-proofing the Washington monument, the problem of how workmen were to be supported on the side of the 555-foot shaft was faced. It was solved by using a giant steel scaffold weighing 600 tons. The steel supporting tubes were set together in such a way that not more than eight and one-half tons of weight rested on any one of the seventy-six posts which formed the ground supports of the structure. The tubes had milled ends fitting into one another and cross bars distributed the weight and added strength. The entire scaffold was so keyed that the weight held the tubes in place. Every six and one-half feet boards were placed to support the workmen cleaning and repairing the monument.



Metal Scaffold around Washington Monument from Which Workmen Are Repairing the 555-Foot Shaft

CHEMICAL FIRE EXTINGUISHER IN COLLAPSIBLE TUBE

Small blazes can be extinguished almost instantly with a small liquid fire extinguisher in the form of a collapsible tube like those used for tooth paste and shaving cream. The tube is filled with a liquid chemical and by removing a screw eye in the top and squeezing the tube, the liquid is forced several feet. The chemical, when it strikes the flame, forms a heavy blanket of gas which extinguishes the fire. The contents of the tube do not deteriorate with age or freeze, and remain ready for use indefinitely. The extinguisher is suited particularly for carrying in the car or as a safeguard in the home or workshop.

Collapsible Tube Fire Extinguisher Operated by Squeezing It after Removing Screw Eye in Top

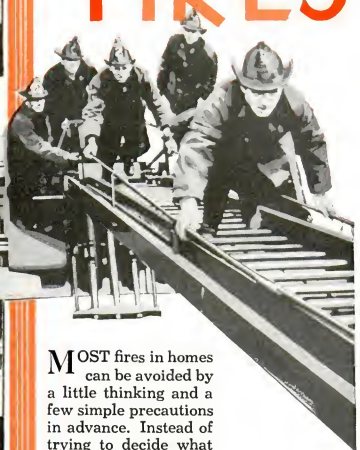
ESKIMO SUN GLASSES USED TO VIEW AIR RACES

One spectator at a recent air race in Canada equipped herself with a pair of Eskimo sun glasses in preference to the usual amber colored glasses. The Eskimo eye protectors are made of wood with two narrow slits for vision and give the wearer a full view of the object being observed without straining the eyes. The Eskimos use them to protect their eyes from the glare of the sun on the snow in the Arctic and they have been found quite adaptable for sky gazing.

Cont. Chabert III
D1033 Isaacs, Nils-1941 H
NW, Washington, D.C.

MANY FIRES ARE STARTED BY TOSSING LIGHTED MATCHES UNDER CAR · · · · ·

Fighting FIRES



CLEANING WITH NAPHTHA NEAR AN OPEN FIRE IS DANGEROUS · · ·

THIS IS A GOOD WAY TO BURN DOWN A HOME · · · · · ·

MOST fires in homes can be avoided by a little thinking and a few simple precautions in advance. Instead of trying to decide what to do in an emergency, why not prevent the emergency? Everyone knows that gasoline mixed with air is a powerful explosive, yet a woman who wouldn't think of having dynamite in the house will pour a pint of gasoline, benzine, or naphtha into an open pan to clean a coat, while the deadly vapor drifts toward the pilot light of the gas stove, ten feet away.

Don't imagine you are safe just because there is no exposed flame near by when using these explosives. Rubber gloves

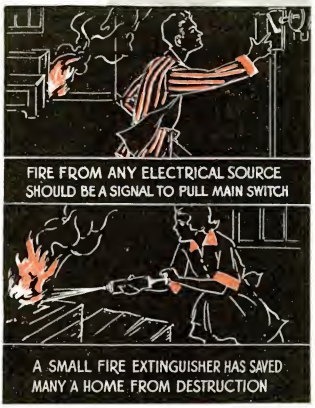
Interview with Calvin
Lo. Lauber, Fire Marshall
Electric of Columbia D.C. 8.3

in YOUR HOME

rubbed over silk can cause a spark sufficient to burn you and your house, as can static electricity caused by rubbing wool, felt, and other harmless looking articles of clothing. More than 2,500 women die from this cause every year, and as many more are horribly burned.

With the custom of placing the garage under the house, the American home has acquired another fire hazard. On cold mornings the choke is left open until the carburetor is flooded. The gasoline drips onto the floor, where it quickly vaporizes. The motor backfires and you have a nasty fire on your hands.

Even if your engine behaves properly, you still have created a fire hazard by flooding the carburetor. If you decide to light a cigaret you don't have to toss the match into the gasoline on the floor for the vapor is filling the room and any flame will ignite it; even a spark when you drop



THE SINGLE STAIRWAY IS OFTEN A DEATH TRAP IN CASE OF FIRE. IT IS USUALLY SAFER TO SMASH A WINDOW TO ADMIT AIR AND THEN ESCAPE DOWN A ROPE OF SHEETS AND BLANKETS

the monkey wrench on the concrete floor.

Do you sleep on the top floor of your home? More than twenty-five people die in dwelling-house fires every day, and four-fifths of these are trapped on top floors. The reason is obvious. Heat rises. A fire in a home commonly starts in the basement or kitchen, and may smoulder for hours, until it finally burns through the floor or cellar door. The pent-up heat, suddenly released, leaps up the open stair well, the pressure increasing every minute as the superheated air finds no outlet and mushrooms along the hall of the top floor.

WHEN FAT BLAZES UP, CLAP A LID OVER THE PAN TO SMOTHER THE FIRE . . .

About this time you wake up and smell smoke. You open the hall door. Instantly the superheated air leaps through this new outlet, you gasp, fill your lungs with air now 500 degrees or hotter, and are injured so that recovery is unlikely.

As long as we build open stair wells and save a few dollars by neglecting to install an automatic vent in the roof, the occupants of the top floors of such dwellings will face this hazard. The single stairway has become a death trap instead of an exit. In a case like this you have but one chance of escape—keep that door shut! If it is hot to the touch it will be suicide to open it. If it is still cool, stand behind it, brace yourself so it cannot be blown inward when the latch is turned and open it just

(Continued to page 116A)

Streamlined Auto-Rail Car Used in France

Latest of the Streamlined Trains to Appear on European Railroads, This Coach, at Left, Stands in Strange Contrast to the Big Locomotive

France's version of the streamlined train is a Bugatti powered auto-rail car being used on the Paris-Deauville route. The front is rounded from the rail to reduce wind resistance. Powerful engines drive the train at high speed.

BOTTLE CAP REMOVER SERVES AS STOPPER

Bottles can be opened and sealed with a cap remover designed to pry off metal caps

Bottle Cap Opener Which Can Also Be Used as a Stopper after Original Cap Is Removed

and also provide a tight stopper for the opened bottle. To close the bottle, it is only necessary to push a rubber stopper on the under side of the opener into the bottle top and slide a metal fastener over the top to secure it tightly in place. The sealer fits any bottle top.

TROUSER LINING GRIPS SHIRT AND ELIMINATES BELT

Belts or suspenders are unneeded if the trousers are equipped with a special waist lining which grips the shirt and keeps the trousers in place. The fabric is of mohair with a permanently laid pile which engages with the shirt, holding both shirt and trousers. The lining is being used particularly for sports clothes where a belt or suspenders might interfere with the activities of the wearer.

¶ Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information, inclosing return postage.

Cmdr Tom White, Box 44
Alameda Calif
D90.

Rich Robes and Masks Mark Chinese Plays

Top and Bottom, Right, Rich Costumes of Chinese Actors; Bottom, Left, Property Room of Chinese Theater Filled with Costumes

Life in old China is presented in faithful detail upon the stage of San Francisco's Mandarin theater, which has an all-Chinese staff and actors brought from Canton and Shanghai. Rich robes and masks painted on the performers' faces mark the plays which are presented nightly from seven o'clock until after midnight. The social status of the characters is shown by the color and shape of the costumes, all of beautiful texture. Colors of the face masks also are of importance. Gentle, straight character parts are played with the face uncolored, but a deceitful statesman is painted white, an upright man is painted red and a severe or brutal character has his face mask of black or black and white. As many as forty brushes are used in "makeup." The Chinese actor times his movements in rhythm with his surroundings. Sometimes the lifting of an eyebrow, a motion of a finger, a mere movement of the eyes, the wrapping of a long sleeve about a wrist, all ruled by the perfect laws

of rhythm, will give the true dramatic sense to the action. Backstage at the San Francisco Chinese playhouse is little different from that of other theaters, except for the absence of the variety and number of curtains and stage sets. Many times a single rich backdrop will suffice for an entire performance. A chair set upon a table represents a scene in a two-story building, the actor climbing to the chair to continue his lines. A play sometimes takes months to present, each night being a continuation. A performance is never repeated. This attests the ability of the actors. Property rooms of the theater contain richly embroidered gowns valued at more than $50,000 and unusual head dresses.

SEAT MADE FROM HOLLOW LOG IS HEWED IN ONE PIECE

In Sequoia National Park, Calif., comfortable park seats have been fashioned from sections of large hollow logs found in the forest. Each seat is made of one solid piece of wood, with the middle portion of the inner surface hewn out to give the seat and back surfaces the proper slant.

This Comfortable Looking Seat Was Cut from a Single Section of a Hollow Log

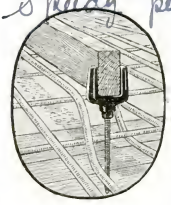
FIREPROOF SUIT FOR AVIATORS FLOATS WEARER IN WATER

Intended to save flyers from either burning to death or drowning in case of a crash, a fireproof and waterproof suit was tested successfully recently in France. The jacket and helmet are fireproof and the trousers, it is claimed, will keep the wearer afloat if the plane should descend in the water.

Testing Fireproof Qualities of Suit of Flyers Which Will also Keep Wearer Afloat in Water

ADJUSTABLE SCREED SUPPORT SPEEDS CONCRETE WORK

Accuracy, speed and economy in laying concrete floors are claimed for an adjustable screed support that may be used on the ground, in a metal pan joist system or attached to I-beams of a steel-frame building. It consists of an ordinary lag bolt with a malleable cast yoke for holding the screed. The lag is screwed into the forms to the proper depth, the screed is placed in the yoke and after the floor has been poured and leveled, the entire support is removed from the soft concrete and saved for use again.



HIGH VOLTAGE *Brings*

Top, Electric Lights Frame Nation's Capitol; Bottom, Rotor for Generating Power from Wind

ONE of Edison's greatest dreams today has come true. Man-made electricity now leaps over mountains, under rivers and across deserts into more factories and homes than any prophet of the nineteenth century ever anticipated.

Barely fifty-five years ago, Edison's famous Pearl Street power station began sending commercial electric current to fifty-nine customers. Today the power utilities of the United States alone serve 25,000,000 paying customers.

No story in fiction can match the rise of electricity in the twentieth century. Forty billion dollars are invested in electric power plants! One hundred billion kilowatt hours of current are served to clients by public utilities. Almost half of our national water power resources are developed. And new schemes for generating power from winds and tides are afoot.

Not only industries, but many farms are now electrified and made to yield several times as much as they did in the nineteenth century with about one-fifth as much labor.

Boulder Dam, with its 1,800,000 horsepower and its 287,000 voltage, Muscle Shoals, Niagara Falls, Norris Dam, Keokuk

D/O 38

Super-Power AGE

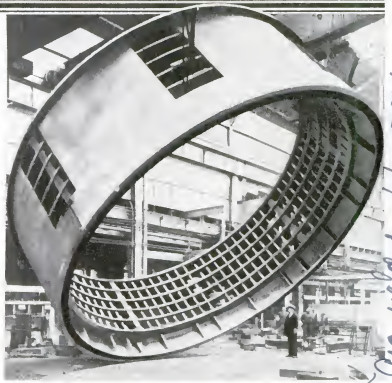
and a dozen similar developments will carry us into the age of super-power, when two or more power units are linked into one "power shed," governed by one central control station which distributes the power, equalizes the burden and increases the efficiency of the electric lines.

The story of our great machine age follows closely the rise of electricity. And the rise of electricity is nothing more than the rise in voltage! When Edison began selling 220-volt current from his Pearl Street station, all his customers lay within a radius of one mile—for that was the maximum range of power transmission.

When electric currents climbed to 500 volts, that gave people the unique thrill of riding street cars for the first time. But electric lighting was confined to those homes or factories lucky enough to lie within a two-mile radius of a power station.

Then transformers were improved, Tesla introduced his alternating-current system and powerful turbo-generators were built, boosting voltage to 1,000 by 1886. George Westinghouse was a great moving spirit in the development, battling the racketeers who wanted to limit power consumption.

The first commercial power transmission



Top, Niagara Falls Lighted by Power It Generates; Bottom, Frame for Waterwheel Generator at Boulder Dam

from Niagara Falls began with Tesla's two-phase system, which was sponsored by Westinghouse. In 1897, power stations were transmitting current under a pressure of 10,000 volts, and one year later they were transmitting at 44,000 volts! Industry was a volt-consuming monster!

When the Chicago, Milwaukee & St. Paul railroad sent the first electric locomotives over the Rocky mountains, it was plain that the company was cutting out a coal-freighting expense. Besides, these 4,200-horsepower locomotives were equipped with regenerating motors, so that in traveling down grade they actually fed current back into the power lines, saving the company fifteen per cent of its power bill.

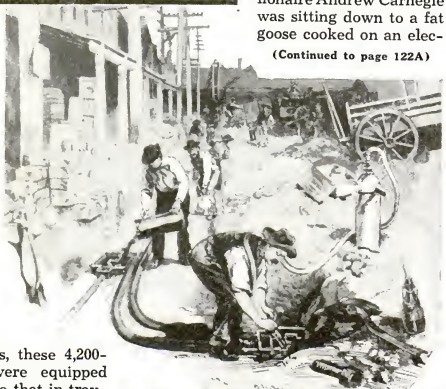
By the end of the nineteenth century industries were discarding steam-boiler plants, shafting and belting. By 1901, when 70,000 volts were piled on the power lines for the first time, electric rapid transit came into vogue. By 1908, engineers had reached the 100,000-volt mark, and housewives began to cast out old brooms and clumsy irons.

What a change in the cities! Electric signs everywhere. There was a "white way" on Main street, and business could be carried on night and day.

In 1912, at 140,000 volts, housewives awoke to find new labor-saving devices for the home—the washing machine, the electric toaster, egg boiler, and the percolator.

As early as 1747, Benjamin Franklin had forecast what he called an "electrical dinner," in which the goose would be killed electrically and cooked electrically. About 150 years later, the millionaire Andrew Carnegie was sitting down to a fat goose cooked on an elec-

(Continued to page 122A)



Drawings from Harper's Weekly, 1882, of Electric Wire Tubes Being Laid in New York

by W. P. Snyder

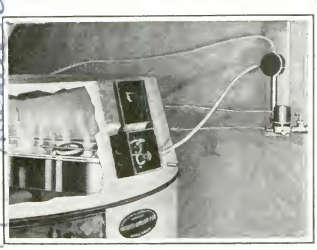
PRE-SCHOOL CHILD MOST PRONE TO FATAL ACCIDENTS

Children under school age are more in danger of death from accidents than older ones who have started to school, statistics reveal. Fatal accidents are almost twice as numerous among children under five as among those between the ages of five and fifteen. Accidents kill more of these small children than measles, diphtheria and scarlet fever combined although the accident death rate for this group has declined twenty per cent in the last few years. Burns, automobile accidents, mechanical suffocation, drownings, falls and poisonings account for about three-fourths of the deaths among small children, burns and scalds alone being responsible for one-fourth of the fatalities.

Equalizer on Chassis Which Flashes Light on Dash When Auto Tire Begins to Lose Air

FURNACE WATER PAN FILLED BY ELECTRIC HUMIDIFIER

No attention or adjustments are required for a warm-air furnace humidifier with an electric control which maintains the proper humidity automatically. A float controls an electric water-supply valve which releases the required amount of water into the evaporating pan.



Warm-Air Furnace Humidifier with Electric Control Which Keeps Water in Evaporating Pan

AUTO TIRE DEFLATION INDICATOR FLASHES WARNING LIGHT

Tires can be kept at proper pressure at all times without constant checking with the aid of a tire deflation indicator which flashes a warning light mounted on the dash when a tire loses even a slight amount of air. The indicator operates regardless of how fast you are driving or how rough the roads may be. It saves tires from rim cutting and from damage in case of a puncture since the warning is flashed before much air has escaped. There are no attachments to tires, valves or wheels. The principal part of the indicator is an equalizing instrument which is mounted on the chassis and which registers any slight deflation of any one of the tires.

ANT KILLER WITH WICK FEEDER IS EASY TO USE

Elimination of ants is made a simple matter with the aid of a liquid killer which is contained in a can equipped with a wick feeder which gives a continuous supply of fluid. The tight cover keeps the contents of the can sweet and attractive and prevents leakage if accidentally upset. Each can contains three ounces of fluid and can be refilled without cleaning or washing. Feeders are placed outside the house and can be moved from one location to another until the insects are exterminated.

Large Collection of Bottles, No Two of Which Are Alike; Note Some of the Odd-Shaped Bottles on Shelves and Cabinet

BOTTLES OF UNUSUAL SHAPES COLLECTED AS HOBBY

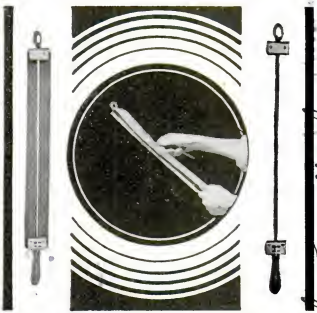
Eight thousand bottles, none over four ounces in size, are in the collection of a Connecticut man who has made it his hobby for the last seven years. The bottles are of many unusual shapes, no two being alike.

HIGH-POWER GAS FLOOD LIGHT CONTAINS SUPERCHARGER

Operating on low pressure gas, either manufactured or natural, a high-power gas flood light for the outdoor illumination of buildings and highways produces 3,000 candlepower through the use of a small supercharger built into a supporting bracket. The unit is equipped with two new type double mantles which spread the light source over an area of twenty-five square inches as compared with the pencil tip area of electric bulbs of a like intensity. Because of this spread, a yellow non-glaring light approaching that of sunlight is produced. In addition to the 3,000 candlepower lamp, one of 1,500 candlepower, along with a special bracket, has been devised for highway illumination and experiments are being conducted with a reflecting type of gas flood light for illuminating buildings from a distance.

ROD HOLDS RAZOR STROP AT PROPER TENSION

Stropping the razor with one hand is possible with an adjustable strop holder. It is simple, consisting of a steel rod, two blocks on which the strop is fastened and a handle with interior thread by which the rod can be lengthened or shortened to give the strop the tension desired. Because of the tension regulation, the razor may be given a more even finish than on strops tightened manually. A modified holder for safety razors also is available.



Left, Razor Strop with Rod Attached; Right, the Rod Which May Be Adjusted for Tension

C2006 Cook-James Montagnes
608 Harbour Commission Bldg.
Toronto 2 Ont. Canada

The Making of a SLED DOG

A FUR trader lost his way in a snowstorm. He sent his lead sled dog in the direction he thought was right. Time after time the dog changed direction. Finally the trader gave in. He gave the leader free rein. Hours later, after fighting its way through the heavy storm, the lead dog brought the team and trader to the fur post. Had the trader followed his own sense of direction dogs and man would undoubtedly have died.

That is but one of many stories which

Above, Automobiles Interfere with Dog Racing; Below, a Typical Dog Team of the Far North

c 2006

Left, Two Good Dogs and Two Fair Admirers; Below, a Dog Racer, Some of His Dogs and the Type of Sled Used for Racing in the Far North

come from the sub-Arctic and Arctic where dogs are still the main means of transportation, and where a sled dog has a high value. These dogs are being improved continually. Originally a mixture of wolf and dog, they are now being bred by the government as well as private individuals in Canada. To the malamute and husky are being added strains of deer hounds and fleet wolf hounds and a faster dog is slowly being evolved for use not only in the Arctic, but also for racing.

These sled dogs, without which no one travels north of the railway line in Canada, are snarling, sulky and quarrelsome beasts. But they have great endurance, and can travel for days, if need be, without food. When extremely hungry they will eat their traces, sealskin boots, and just about anything they can sink their teeth into. One of the unaccountable happenings of the north is the dog disease which sweeps across the country every few years, wiping out hundreds of dogs. The causes of this strange malady are unknown although

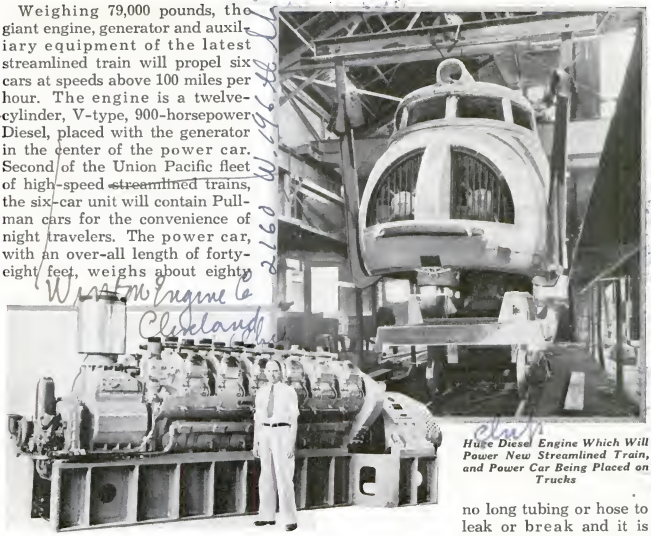
(Continued to page 124A)

The Type of Dog Which Pulls the Sleds of the Arctic and Which Is Used in the Dog Derbies

Baffin Island dog

Latest Streamlined Train Has Giant Engine

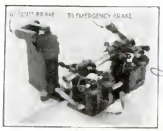
Weighing 79,000 pounds, the giant engine, generator and auxiliary equipment of the latest streamlined train will propel six cars at speeds above 100 miles per hour. The engine is a twelve-cylinder, V-type, 900-horsepower Diesel, placed with the generator in the center of the power car. Second of the Union Pacific fleet of high-speed streamlined trains, the six-car unit will contain Pullman cars for the convenience of night travelers. The power car, with an over-all length of forty-eight feet, weighs about eighty tons, almost one-half of the weight of the entire train, which weighs 197 tons. Engine and generator occupy a space of twenty feet. The engine was tested for 700 hours before being installed.



Huge Diesel Engine Which Will Power New Streamlined Train, and Power Car Being Placed on Trucks

BRAKE EQUALIZER AND BOOSTER ATTACHES TO ANY CAR

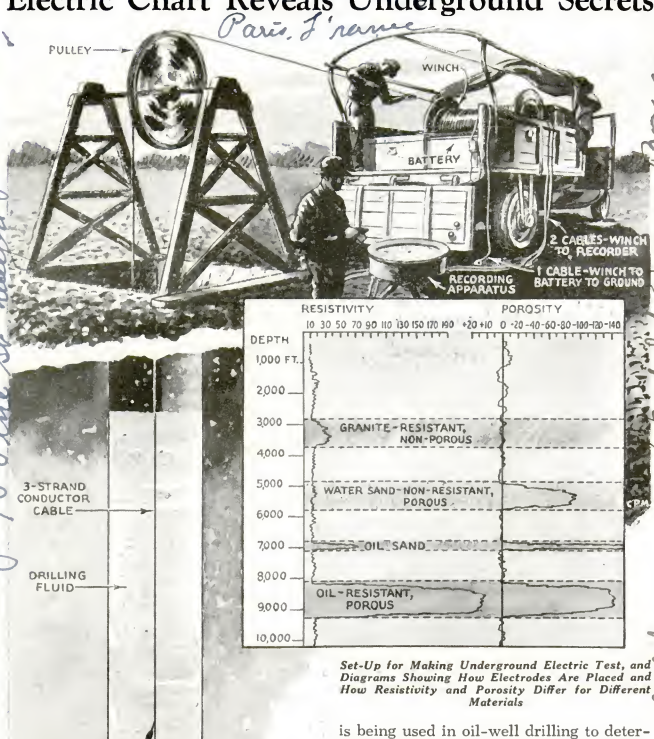
All of the advantages of hydraulic brakes and mechanical brakes are combined in an equalizer and booster now being offered for small cars. For Fords, the unit, containing four cylinders, is mounted on a central cross member of the frame. It is connected to the brake rods, the foot pedal and the emergency brake. There is no long tubing or hose to leak or break and it is claimed braking power is increased four times due to a booster cylinder and equalization of power. Automatic bleeding and feeding are made possible by the fact that the four cylinders are connected by holes drilled at the top and, being lower than the booster cylinder, the air is forced out as the fluid is poured into the reservoir above the cylinder. Rubber covers keep out moisture and standard lubrication fittings are employed.



SPEED OF EAGLE MEASURED AT TWO MILES A MINUTE

"Swift as an eagle in its flight" means about 120 miles per hour. This was the speed attained by a golden eagle in the Scottish mountains which was watched by an observer who had an opportunity to time the bird over a three and one-half mile course. During its flight the eagle made an altitude gain of about 1,000 feet.

Electric Chart Reveals Underground Secrets



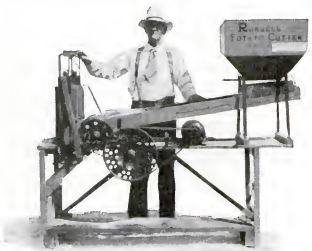
Set-Up for Making Underground Electric Test, and Diagrams Showing How Electrodes Are Placed and How Resistivity and Porosity Differ for Different Materials

By means of an electric chart, delicate and accurate measurements can be made at great depths underground, revealing the nature and content of the hidden rocks. It is being used in oil-well drilling to determine the kind of rock at any given depth, how much oil the strata will produce, the temperature and hydrostatic pressures of the rock and the slant of the strata. With some additional equipment, the apparatus can survey the inclination and direction of the entire hole or perforate the steel oil-well casing to admit a greater flow. In determining the composition of hidden strata by electrical means, two factors are considered: the degree of electrical resistance of the various strata, and the degree of porousness. Rocks are conductive or

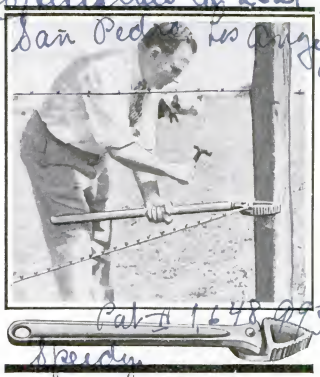
resistant to electricity in proportion to the amounts of mineral salts dissolved in the absorbed water they contain. To determine the exact degree of resistance, three electrodes are lowered into the hole on a three-strand conductor cable. The cable strand connected to the lowest electrode runs to a battery at the surface and from that to a ground near the drill hole. Current flows from this electrode into the surrounding earth and travels upward through the structure being measured. The two upper electrodes are connected by their cable strands to the terminals of a potentiometer which measures the differences of potential between the two upper electrodes caused by the passage of the current from the lower one through the strata. From the differences of potential at various points in the hole, the varying resistances at such points are calculated. These measurements are recorded in a continuous automatic graph and a graph of the porousness of the strata is also shown. The kinds of structures are interpreted from the chart by careful calculation of the degrees of porosity and resistivity at the various points.

SEED POTATO CUTTER OPERATED BY HAND CRANK OR MOTOR

Cutting seed potatoes by hand has been eliminated by a self-feeding rotary cutting machine which can be operated by a motor or by turning a crank. It is claimed this cutter prepares seed potatoes for planting ten times as fast as the work can be done by hand.



Self-Feeding Seed Potato Cutter Which Can Be Operated by a Motor or by a Hand Crank



Still Another Use for Wire-Puller Which Was Designed for the Concrete Worker

HANDY WIRE-PULLING TOOL HAS MANY USES

Designed for pulling the wires from concrete walls, a handy tool has been developed to serve many purposes. It automatically grips the wires at any point and will not slip. In a smaller size, it is handy for stretching plumbers' tape, strap iron or wire of any size. The farmer finds the tool useful for repairing wire fences.

LOCK PROTECTS AUTO RADIO FROM REMOVAL BY THIEF

Removal of the automobile radio from the car can be prevented by a lock that is easily attached. Installation may be effected without removing the radio from the car and without making changes in the set. The device locks the radio to the dash plate on which it usually is installed, preventing thieves from loosening the bolts. Two of the lock models are constructed from solid bar steel, one chrome-plated and the other finished in black enamel.

Making HOME TASKS

Above, Tank for Soap and Water Attaches to Standard Floor Machine for Shampooing Carpets without Soaking; Below, Colander Attachment for Mixer Is Used in Making Purees

Above, Electric Motor-Driven Ice-Cream Freezer Fits into Cube Compartment of Automatic Refrigerator; It Makes Ice Cream Free from Lumps; Below, Holders Grip Window Shade Tightly on Rollers without the Use of Tacks

A PLEASURE · · ·

Above, Electric Coffee Grinder Solves Problem of Fresh Coffee; Its Top Container Holds One Pound of Bean Coffee and, Being Transparent, Indicates the Amount of Coffee on Hand; Grinding Unit Is Adjustable to Produce Coffee of the Fineness Desired; the Grounds Container Is Quickly Removable and Is Graduated in Per Cup Requirements; the Machine May Be Finished to Harmonize with Kitchen Decorations

Below, Rack in This Roaster Permits Removal of Roast or Fowl with Ease, Eliminating Danger of Burning Fingers; the Rack Is Lifted from Roaster by Handles on Each Side

Above, Handy Rack Attaches to Chair Back for Drying Clothes Near Radiator; It Also May Be Attached to Closet Shelf for Holding Coat Hangers or to Wall to Serve as Towel or Tie Rack

Left, Basket Carrier and Pin Bag Ride Line to Make Easier the Task of Hanging Out Clothes; Right, Automatic Pea Sheller Attaches to Electric Mixer; Empty Hulls Drop Out on One Side and Shelled Peas into Bowl on the Other

Plane with Two Motors Set Close Together in Streamlined Nose so One Will Fly Ship if Other Fails

TWO MOTORS IN NOSE OF PLANE MAKE FLYING SAFER

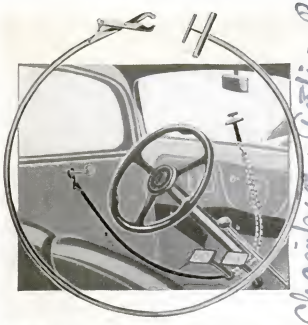
Unusual in design and construction, a "fearless" plane, so named because it is intended to remove much of the hazard of flying, was recently tested successfully in California by Allen Lockheed, its builder. The two motors of the craft are built into the streamlined nose of the fuselage and the additional safety factor lies in the fact that they have been placed so close together that the failure of one will not result in the perilous "circular drift" which has precipitated so many aerial accidents.

SELF-CLOSING PASTE-TUBE CAP WORKS LIKE CLOTHESPIN

Screwed on in the place of the ordinary cap, a new self-closing cap for paste tubes has a coil spring that causes it to operate like a clothespin. Opening the cap is similar to cocking a gun, by pressing the cap lever. When the upper half of the cap reaches the open position, a catch holds it until the paste or cream has been squeezed out. A button protruding slightly on the right side of the cap releases it to close at a slight touch. Even the small shock of laying the tube in the medicine cabinet will release the catch, making the cap practically self-closing.

OPENER UNLOCKS CAR DOOR AND SAVES WINDOW

When the car owner locks himself out, he need have no worry about getting in again if his garage man is equipped with a door opener which is operated without breaking any glass or damaging the car otherwise. In order to thwart thieves, the opener is sold only to authorized dealers and shop owners. It consists of a copper tubing with a cable inside. This is inserted through the clutch pedal or steering post opening, then by means of hand controls or a grip plunger it is directed to the inner door latch and



Elongated Gripping Device with Scissors Action for Opening Locked Car Doors from Outside

attached by a gripping device with a scissors action. One twist of the wrist then pulls the latch and unlocks the door.

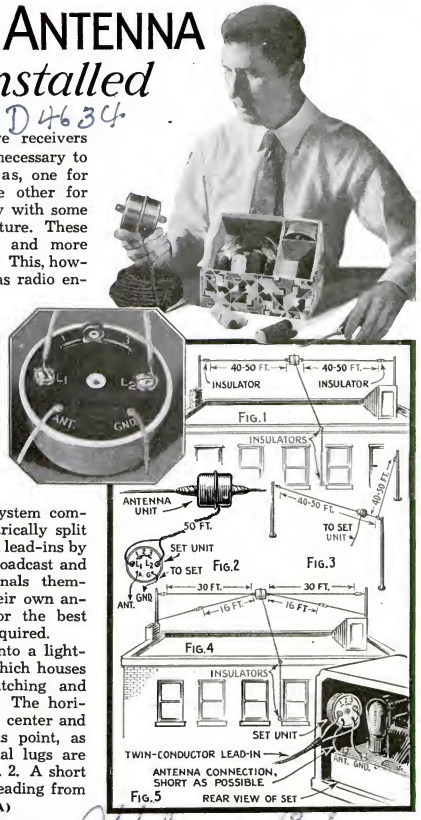
ALL-WAVE ANTENNA
Easily Installed

D 463 4.

MANY owners of all-wave receivers have found that it was necessary to erect two separate antennas, one for broadcast programs, and the other for short-wave signals, preferably with some form of noise-eliminating feature. These require considerable trouble and more room than is usually available. This, however, is no longer necessary as radio engineers have recently developed special antenna kits that combine all the desirable features in a single antenna. The new systems give maximum signal strength and a minimum of background noise. You can install this antenna yourself and demonstrate it to your friends and neighbors, who will probably want you to put one up for them. The system comprises a single antenna, electrically split into two efficient antennas and lead-ins by the differing frequencies of broadcast and short-wave signals. The signals themselves automatically select their own antenna and lead-in circuit for the best results, and no switches are required.

The antenna unit is built into a lightweight aluminum container which houses the necessary impedance-matching and frequency-selecting members. The horizontal wire is cut in the exact center and the unit is connected at this point, as shown in Fig. 1. The terminal lugs are then taped as indicated in Fig. 2. A short length of twisted-pair cable, leading from

(Continued to page 132A)



Technical Appliance Corp.
27 Jackson Ave Long Island City, N.Y.

Beginners can PORTABLE

By FRANK LESTER
W2AMJ

HERE is that really portable short-wave band-spread receiver that you have been waiting for. The cost is low and the construction details are simplified for quick assembly with few tools. This little two-tube receiver is about the size of an ordinary box camera and weighs only 9 pounds complete with its self-contained batteries.

Band-spread coils of a new ready-wound variety cover all short-wave broadcast and amateur bands from 19 to 160 meters. The construction parts, including a drilled metal case, cost $7.95 and the coils are 55 cents each. The antenna consists of a 20-ft. length of flexible insulated wire which may be thrown over the top of a car or into the branches of a tree. This set may be operated anywhere and the tests on all bands were satisfactory in every respect. Canadian and South American stations were received in the Chicago area, and European broadcast programs in tests made near New York City. It is an excellent portable short-wave set for the beginner to build as it does not become obsolete. Should the builder decide to become a licensed amateur he will require a good monitor, and this well-shielded receiver is also suitable for that purpose.

Two type-30 tubes are employed; one is a regenerative gridleak detector and the other a transformer-coupled audio amplifier. There is no crowding of parts and both batteries fit snugly inside the metal case which is 6¾ in. high, 5¼ in. wide and 8¾ in. long. The A-battery consists of an ordinary 4½-volt C-battery, and the B-battery is

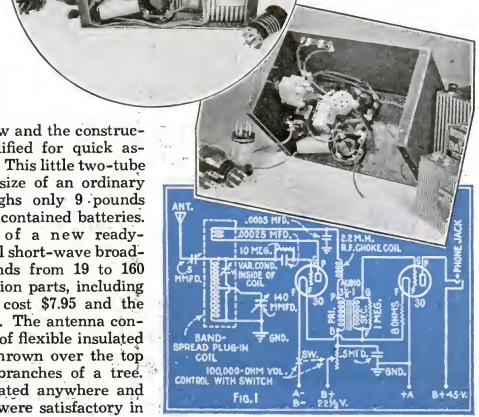
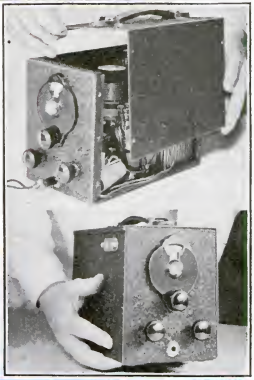


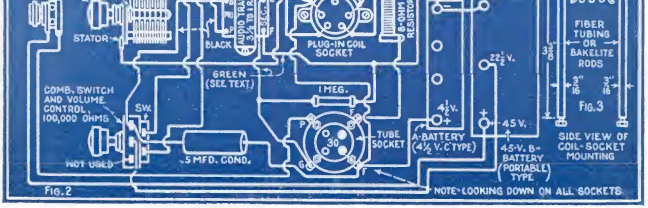
Fig. 1

build this SHORT-WAVE RECEIVER

a portable-type 45-volt block. Diagram, Fig. 1, shows the Alden band-spread plug-in coil and its built-in padding condenser within the dotted lines. Each coil is equipped with this little condenser which is provided with an adjusting screw on the top so that it may be set to the bottom of that particular wave band; the regular tuning is done with the 140-mmfd. variable condenser. It will be noted, in the simplified wiring diagram, Fig. 2, that all parts are shown in their relative positions looking down on the sockets. Be sure that your sockets are arranged with the terminals in the same position. Both tube sockets are mounted directly on the bottom of the case and the coil socket, Fig. 3, is elevated about 3½ in. above the bottom of the case so that the various plug-in coils may be inserted through a hole cut in the top of the cover just under the carrying handle. This hole is covered by a tight-

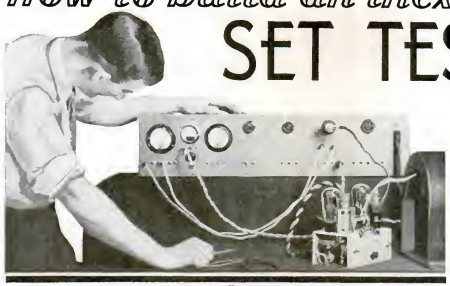
(Continued to page 130A)





How to build an inexpensive . . .

SET TESTER



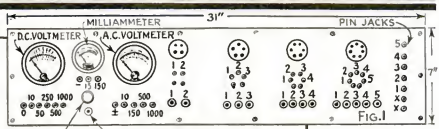


FIG.1

ALL tests necessary to check any radio receiver are possible with this low-cost homemade test panel. The layout is designed for the experimenter or service man's workbench.

The tester provides for checking all a.c. or d.c. voltages from 0 to 1,000 volts; also d.c. current in two ranges, 0 to 15 and 0 to 150 milliamperes. Resistance tests are easily made on an 0 to 500,000-ohm scale to be described later. Voltage and current readings are available on the new tubes as well as older types.

Panel material of any description may be employed; in this case hard pressed board was used. The wood cabinet is made from ¾-in. stock and the depth is 7 in.

The various parts are arranged as shown in Fig. 2 and the rear-view photo at lower right. It will be noted in Figs. 1 and 4 that the sockets are all mounted with the filament, or heater, terminals down. Midget pin jacks are placed on the panel in the same terminal arrangement directly below each socket. These pin jacks are for the tube voltage tests; the leads to the cathodes, grids and plates are cut in by the small closed-circuit jacks below, for current readings. A separate clip-lead is used to connect the grid cap on the tube in the test panel to the cap wire in the set; this external lead will be noted in the upper

(Continued to page 132A)

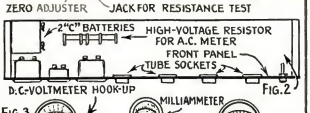


FIG.2

FIG.3

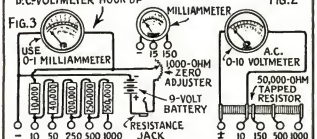


FIG.4

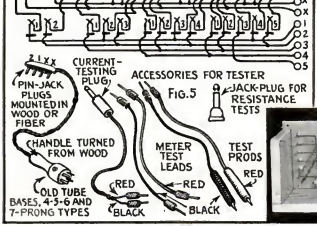
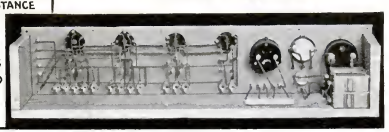
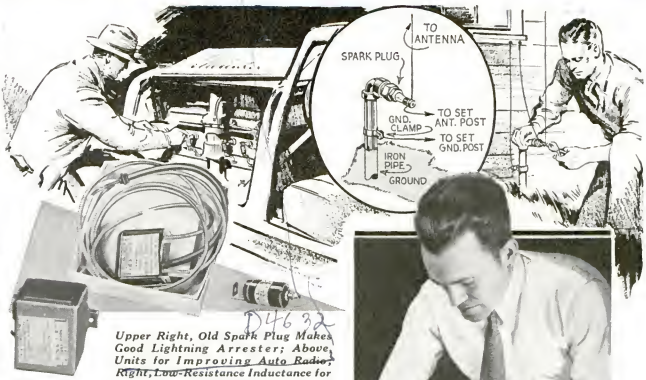


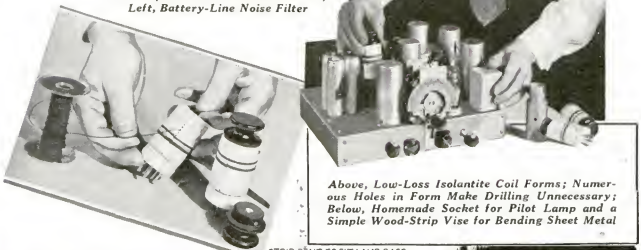
FIG.5



Easy Solutions for Everyday Radio Problems

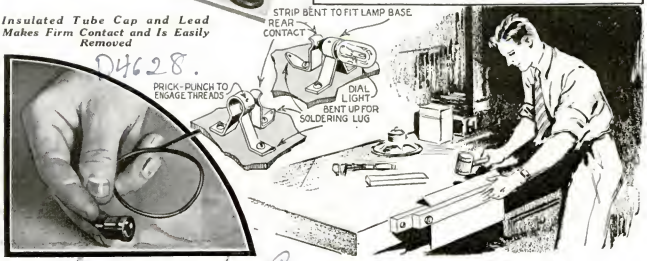


Upper Right, Old Spark Plug Makes Good Lightning Arrester; Above, Units for Improving Auto Radio; Right, Low-Resistance Inductance for Spark Plugs; Will Not Interfere with Ignition; Center, Automatic Generator Control Compensates for Set Drain on Battery; Increases Generator Output When Receiver Is On; Left, Battery-Line Noise Filter



Above, Low-Loss Isolantite Coil Forms; Numerous Holes in Form Make Drilling Unnecessary; Below, Homemade Socket for Pilot Lamp and a Simple Wood-Strip Vise for Bending Sheet Metal

Insulated Tube Cap and Lead Makes Firm Contact and Is Easily Removed



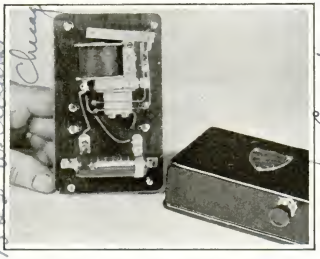
All-Wave Superheterodyne Band-Spread over Entire Receiving Range

Above, Front Panel Showing Airplane-Type Tuning Dial; Below, Top View of Chassis Arrangement

Tuning from 10 to 500 meters, this six-tube super automatically spreads each band selected over 270 degrees on the tuning dial. Eight manufacturers of radio parts sponsor the set for home assembly. A foundation unit and additional materials are supplied through numerous radio parts dealers. Pre-adjusted plug-in coils are employed for the various wave bands.

Overload Relay Is Adjustable

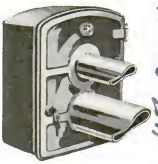
The loss of valuable tubes, transformers, condensers and meters in amateur transmitters is prevented by the use of this simple relay that may be adjusted to take care of unexpected overloads. It can be set to open the 110-volt input line when the plate currents exceed any value from 150 to 500 milliamperes. A re-set button restores circuit when overload is removed.



Overload Relay with Cover Removed; Clip on Variable Resistor Adjustable for Maximum Safe Load

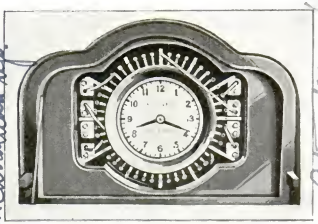
Photo-Cell Relay Is Weatherproofed

Completely enclosed in cast aluminum case, this photo-electric relay is fitted with tubular visors to protect the lenses in front of the cell and lamp. Weatherproofing overcomes the difficulties normally caused by rain, snow, sleet and the effects of extraneous light when used in outside installations. The circuit operates on standard 110-volt power lines.



Eleven-Tube Receiver Tunes Itself

A radio receiver that turns itself on and off, also automatically tunes to any of 14 different pre-selected programs, for any pre-determined time, is now available. An electric clock and controls for the automatic selector are mounted on the instrument panel above the usual tuning knobs.



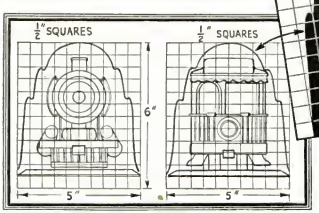
Jack-and-Clock System That Permits Pre-Selection of Automatically Tuned Stations

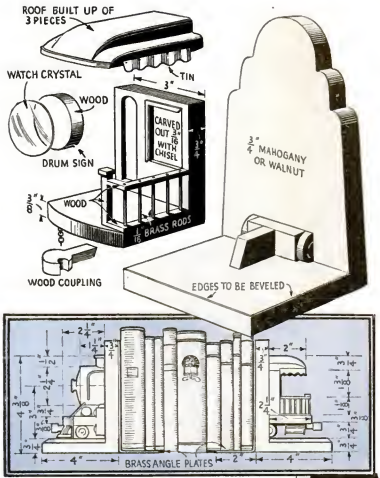
Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

AMATEUR MECHANICS

A pair of RAILROAD BOOK ENDS

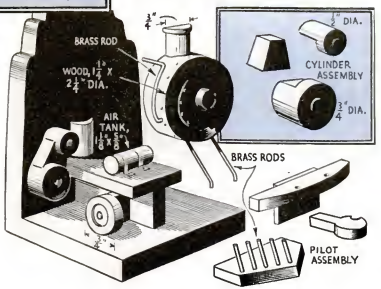
THE effect of a transcontinental train passing through a row of travel books is decidedly novel, and a pair of neatly finished book ends giving such an illusion will make a very welcome gift. All of the cylindrical parts of the locomotive front can be best done on a lathe, of course, but if such equipment is not available a fairly satisfactory job can be accomplished with a jackknife. The backs will have to be cut with a scroll or coping saw. Fasten the back on the base with finishing nails and further reinforce it with a brass angle plate screwed to both pieces from the back. Wheels, air tank and cylinders are installed as indicated. The cylinder assembly is built up of three pieces, fastened together with brads and model-airplane cement. This waterproof cement is ideal for model work of all kinds, since it can be had in a colorless variety, and will hold wood, leather, metal and even glass with great tenacity. The front end of the boiler is fastened to the back with finishing nails and cement, the headlight having been turned on the front end. Brass rod 1/16 or 3/32 in. in diameter is installed for the hand rail, front braces and pilot. In the latter case the rods are set in holes in the bottom part of





drum sign on the rear of the observation platform paint a wood disk with the emblem of your favorite train, and cement a wristwatch crystal over it.

In a job of this kind, the painting is quite as important as the construction. Adhering strictly to the colors used on most trains leaves a rather drab job, and it is suggested that some bright touches be applied. For instance, paint the observation car olive green, but use bronze, or gold leaf here and there. Red wheels with black or aluminum rims are effective, and perhaps red and light grey striping on the awning. The locomotive boiler should be in black, as well as the smokestack, cylinders and base or frame, except along the edge, where it should be bronze or gold. Wheels should match those of the observation car. In each case use a brushing lacquer, which dries quickly, over

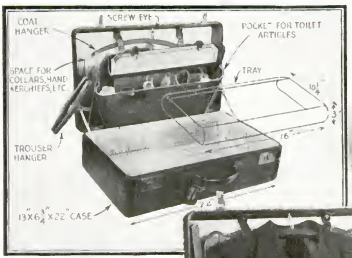


the pilot only, and cut off even at the top to butt against the underside of the locomotive frame. An attempt to insert the upper ends of the rods in holes also would result in some difficulty because of the angle. Dummy couplings are carved from white pine.

In building the observation car, the back end of the car body is recessed to represent the door and window. The latter should be about 1/16 in. deep, and a square of glass is fitted carefully into the recess, which has been painted black. Wood putty can be pressed neatly around the edges to hold it in place, and a frame molding cemented around the outside of the window. The door requires no glass, but will be improved with a frame molding. Note that the spindles of the railing are brass rod, with top and bottom rails of wood. If you wish to make an extra fancy job, use brass rails as well as spindles. The top of the car is built up of three pieces as shown, with a scalloped awning of tin nailed around the edges. The steps can be made of sheet brass. For the a wood filler. Two or three coats will be sufficient with thorough polishing with steel wool between coats. Backs and bases are most effective in a wood stain with a shellac or varnish finish. In the painting, do as much as possible before assembly, as a much neater job can be accomplished.

If salt is sprinkled heavily over soot that has been spilled on a rug, the soot can usually be swept away without discoloring the rug.

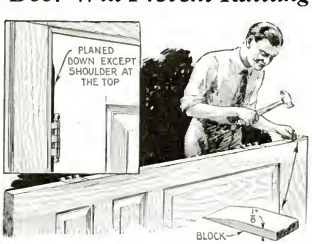
Small Altered Case Holds Entire Wardrobe



You can pack a suit, dressing gown, three or four shirts, pajamas, collars, shaving accessories, etc., in a traveling case several inches smaller than the average size suit case. A screw eye is driven in the top edge to hold a coat hanger. The pocket of a discarded case is glued to the cover at the hinged edge. This will hold your toilet articles. Behind the pocket is plenty room for handkerchiefs and collars. Snaps are provided so that the upper end of the pocket can be held in place. A sheet-metal tray, neatly enameled, fits inside the body of the case. In packing, lay the lower end of the coat on the bottom of the case, which will prevent a sharp crease. Then fold the trousers on a piece of heavy cardboard and place them on the lower part of the coat. A dressing gown or rain coat may then be added, and the tray laid on top, after which the case is closed.—W. J. Reed, Aurora, Ill.

Thin Block Tacked to Edge of Door Will Prevent Rattling

Before hanging the doors in a building at a Century of Progress, the rear edge of each one was planed down to leave a small shoulder at the top as indicated. The shoulders bind against the door casings and prevent rattling. Similar results can be had in the home. If you do not wish to plane the doors, nail a thin wedge of wood to the hinged edge of the door.



¶After waxing your floors, polish the bottoms of the chair rockers to prevent them making unsightly marks on the floors.

Large Funnel Slipped over Shovel Handle Protects Hand against Heat When Cleaning Stove Fire

Shield on Short Shovel Protects Hands When Firing Stove

Slipped over a short shovel handle, a large funnel provides a shield to protect the hands against heat when firing or removing clinkers from your furnace or heating stove. The lower end of the spout should be removed, leaving just enough to hold the funnel in place.—Fred W. Schneider, Towaco, N. J.

Cutting Metal on Jig Saw

Metal can be cut on a small jig saw by using a section of hack-saw blade. After enlarging the saw slot in the table to accommodate the blade, attach it in the regular way. If your saw uses blades that have holes in both ends, the hack-saw blade will have to be annealed and drilled at one end as only one end has a hole. However, if the blades clamp in jaws, all you need to do is grind the ends of the blade to fit. Use plenty of cutting oil to prevent heating.

Short Piece of Hack-Saw Blade Used to Cut Metal on a Small Jig Saw

Cork Disk in Ink Bottle Serves as Guide for Penholder

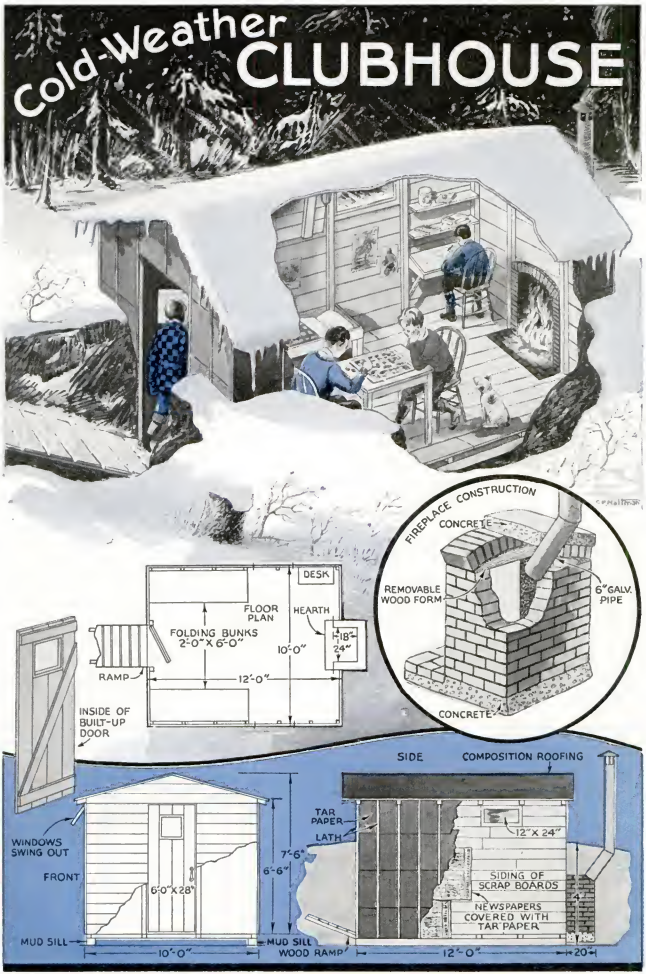
Rolled up and inserted into an ink bottle, a thin cork disk will float on top of the ink and serve as a guide to prevent dipping a pen too far. The disk should be of a size to fit loosely inside of the bottle. Another advantage of the disk is that it helps to keep the ink mixed, thereby eliminating accumulations of sediment in the bottom of the bottle.

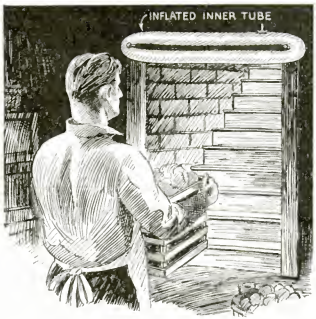
Inspecting Photo Negatives for Density and Contrast

Inspecting negatives after they come from the fixing bath is an easy matter if they are placed face down on the surface of water contained in a black rubber, or black enameled, tray. In this way, by reflected light, they appear as positives, and density and contrast can be inspected to determine if further treatment is required.

Rubber Heels on Floor Brush Protect Legs of Furniture

Tacked to the ends of a floor brush as indicated, a couple of rubber heels provide excellent bumpers to prevent marring the legs of furniture when sweeping around them. The rubber should project about ¼ in. over the edge of the brush. Besides serving as resilient bumpers, the heels loosen gummy substances from the floor that cannot be removed with the brush.


Cold-Weather CLUBHOUSE
FIREPLACE CONSTRUCTION
CONCRETE
REMOVABLE WOOD FORM
6" GALV. PIPE
CONCRETE
DESK
FLOOR PLAN
HEARTH
FOLDING BUNKS 2'-0" X 6'-0"
10'-0"
18" 24" 7"
RAMP
12'-0"
INSIDE OF BUILT-UP DOOR
SIDE
COMPOSITION ROOFING
TAR PAPER
LATH
12" X 24"
WINDOWS SWING OUT
FRONT
7'-6"
6'-6"
6'-0" X 2'-8"
SIDING OF SCRAP BOARDS
NEWSPAPERS COVERED WITH TAR PAPER
MUD SILL
10'-0"
MUD SILL
WOOD RAMP
12'-0"
20



Inner Tube Suspended above Low Door in Basement Protects Head from Painful Bumps

Inner Tube Prevents Bumping Head against Low Door

In many places, such as dark basements, where a low doorway is often forgotten and you are likely to bump your head, try this idea to prevent such trouble. Just get an old inner tube that will hold air, inflate it and stretch it across the upper casing of the doorway. It will serve as an effective cushion to avoid these bumps.

Rubber Tubing Protects Shoe Heels against Skate Clamps

To prevent skate clamps from marring your shoe heels, cut off short sections of rubber tubing and slip them over the ends of the clamps. Rubber tubing will be found much better for this purpose than either paper or leather.

Mending Broken Chinaware

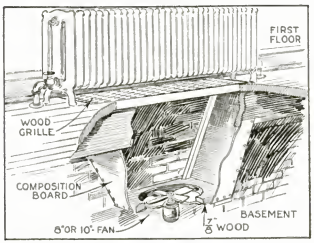
Broken chinaware can be repaired with a cement made by dissolving casein in a saturated solution of borax to form a thin paste. After applying the cement to the broken edges, bind them together and let the article set for a day. Another cement that sets more rapidly is made by grinding casein into a solution of water glass. These ingredients should be thoroughly worked together by hard rubbing. The cement should be used immediately.

A Stove-Lid Lifter That Will Not Slip

A stove-lid lifter that will not slip is made easily from a piece of spring steel. The ends of the steel are annealed and holes are drilled in them to fit the projections inside of the lifter hole in the lid. After shaping the steel, heat it to a cherry-red color and quench it in water to harden it. To use the lifter, squeeze the ends together with the hand as it is inserted into the lid.

Fan Increases Efficiency of Radiator in Home Heating System

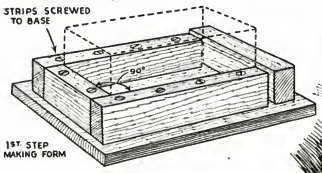
By mounting a small ventilating fan in the basement, as shown, to force air up between the fins of a radiator, it is possible to get a more uniform distribution of heat and thus reduce fuel consumption. An opening in the floor under the radiator



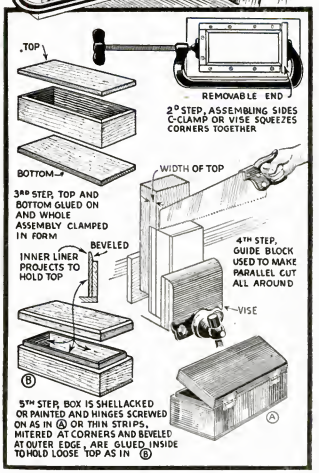
Fan Directs Air Blast around Radiator and Helps to Distribute Heat Uniformly

is fitted with a wood grille, and, in the basement under this, is suspended a wide V-shaped box of composition board, the lower end of which holds the fan.

Form Simplifies Making Small Glued Boxes



Small wood boxes with glued mitered corners can be made quickly and accurately by using a form in which the assembly is clamped. The form consists of three wood strips screwed to a base, the inside dimensions of the form being the same as the outside size of the box. The sides of the box are cut to correct length, casein glue is applied to the mitered ends, and the pieces are then set up in the form. A separate block is placed against the end of the box and the pressure of a C-clamp or vise will then keep the glued edges firmly together. If the form has been impregnated previously with melted paraffin, glue will not adhere to it and the assembly of sides can be removed without trouble. Next, the top and bottom of the box are laid on the glue-coated edges of the sides, and the box is again placed in the form, this time with a block on the top, the C-clamp straddling top and bottom to squeeze these pieces against the sides. After the glue has dried, make a guide block for sawing the box in two, both block and box being held in a vise. The guide block enables you to make a neat cut which will be parallel to the top. Then wood liners, also mitered at the corners, are placed inside the box to hold the cover, or the cover may be hinged.—J. E. Dekker, Chicago, Ill.



Cleaning Windows and Mirrors

Windows and other glass surfaces may be thoroughly cleaned and highly polished with a compound made by mixing precipitated chalk, 7 oz., and tripoli, 2 oz., with a strong soap solution. The latter is made by dissolving castile or an equivalent grade of soap, 2 oz., in boiling water, 4 oz. After the soap has been dissolved, add the chalk and tripoli and stir until the mixture is smooth. This preparation is applied with a cloth and is allowed to dry, after which the surplus is removed.

Clothespins that have been boiled in salt brine will be toughened against splitting and will not freeze to wet clothes on the line.

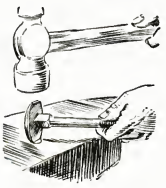
It Takes a Skillful Shooter to Run Up a High Score on This Marble Board

A Simplified Marble Game

Here is a game that will test your skill as a marble shooter to run up a high score. It is merely a board 3½ ft. long and 2 ft. wide having strips nailed to the sides and one end which project 1 in. above the top surface, the end strip being wide enough to elevate the end slightly. The idea of the game is to shoot the marbles with the thumb from the mark at the lower end into shallow holes spaced and numbered at the upper end as indicated.

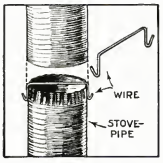
Flattened Edges on Head of Carriage Bolt Prevent It from Turning

To lock a carriage bolt so that it will not turn when removing the nut, a blacksmith hammers over the edge of the head in two places as shown. The projecting edges "bite" the wood surface and hold the bolt so that the nut can be loosened with a wrench.



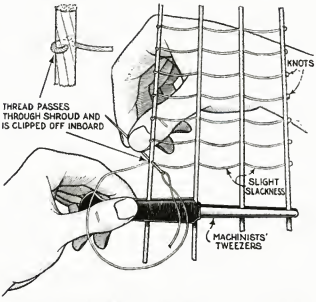
Stop Prevents Sections of Stovepipe from Collapsing

When several sections of stovepipe are put together they sometimes telescope more than intended and allow the end of the pipe to pull out of the chimney hole, which may cause a fire. To prevent this, bend lengths of wire over the crimped end of each section as shown to engage the end of the adjoining section.—Claude E. Johnson, Romance, Arkansas.



Attaching Ratlines to Mast Shrouds of Ship Models

Instead of attaching ratlines to outside shrouds with half hitches as is commonly done on ship models, use the following method: Grip the shrouds horizontally with a pair of tweezers, and with a fine needle, draw the free end of the ratline thread through each one of the shrouds. Passing the needle through both the shroud and the ratline at right angles locks



Ratlines Threaded through Shrouds with Needle Simplifies Job of Rigging Ship Models

the thread, after which the inboard end is cut off close to the shroud and touched with a drop of shellac to hold it. Note that the ratlines are left a trifle slack between the shrouds.—H. T. Bodkin, Chicago.

FURNITURE SCARS
Easily Removed

MINOR injuries to your furniture, such as scratches, dents, scuffs and stains, are easily touched up, hidden or filled. Perfume, hair tonic and similar stains that turn white are removed with some spirits of camphor. Wipe the whitened surface quickly and immediately give the area a brisk rubbing with a dry cloth. A good furniture or wax polish will then bring up the luster; on a satin finish use a furniture polish and on a gloss finish use polishing wax.

Very light scratches can be made invisible by use of either polish or wax alone. Lay on a fairly generous application of the polish in and about the scratch and allow it to dry. Then apply the polish to the whole surface and after it is sufficiently dry rub vigorously with a dry cloth. The first application builds up under the second coat and thus helps to fill and hide the abrasion. Another method of restoring the luster on a surface that is checked or marred is the use of a rottenstone polishing pad. Cut a small square of fine-mesh cloth, lay it flat on the table and place about three tablespoonfuls of the abrasive in the center. Fold the cloth in from the corners and draw it tight to form a rounded polishing surface and at the same time retain the abrasive. Pour a small quantity of boiled linseed oil over the surface of the work and rub with the pad, the strokes working away from the center with a circular overlapping movement. The polisher should travel across the scratches.

To remove white spots caused by perfume or toilet water, wipe them with spirits of camphor on a cloth and then rub briskly with a dry cloth

When filling deep scratches with wood filler, it is stained to a slightly darker shade than the surface to be matched and is then forced into the scratch with a putty knife

On a dark-stained surface no amount of polishing or rubbing down will obliterate the blemish that goes through to the wood. If the scratch is deep and narrow, first clean out all the loose material, taking care not to break the varnish film at the edges.

Very light scratches can usually be made almost invisible by the use of either wax or polish alone

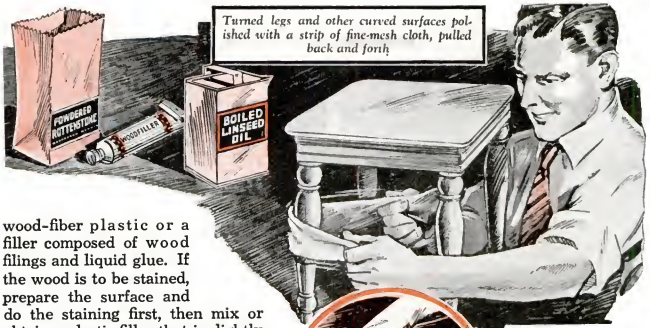
Fine sandpaper is used to smooth wood filler down to the surrounding surface

Staining a light scratch to match surrounding surface

Then stain a wood filler to a slightly darker shade than the surface to be patched and force it into the opening with a putty knife. Allow this to dry and then coat it with shellac, which permits polishing later. To remove excess filler use 8-0 sandpaper and sewing-machine oil after you apply the shellac.

A careful rubbing with a fine abrasive will remove scratches on turned table and chair legs. Cut a strip of fine-mesh cloth about 24 in. long, dip this in boiled linseed oil, and sprinkle it with powdered rottenstone. Loop the cloth about the turning and pull the cloth back and forth. Apply polish in the same way, with a dry cloth. This method will not do on a light surface. Here it is necessary to omit the rottenstone and instead impregnate the cloth with a wood filler in the natural color. Allow the cloth to dry for a few minutes until the filler stiffens and then rub it into the openings until level with the surrounding surface. Remove the excess with a clean cloth, allow to dry, then sand lightly with 8-0 finishing paper and sewing-machine oil.

If a large surface has been dented, it is generally better to remove the old finish, raise the dent, and then refinish. If the surface is in very bad condition, it will pay to turn the job over to an expert refinisher. However, a simple refinishing job can be handled by the amateur. Take off the old finish with a scraper. Judicious use of a dampened cloth folded to several thicknesses, and a hot flatiron will raise shallow dents to the level of the surrounding surface. Lift the flatiron every few seconds, continuing the process until the depressed area is raised to the proper level. Digs and deep scratches should be filled with a plastic, such as stick shellac, a



Turned legs and other curved surfaces polished with a strip of fine-mesh cloth, pulled back and forth

wood-fiber plastic or a filler composed of wood filings and liquid glue. If the wood is to be stained, prepare the surface and do the staining first, then mix or obtain a plastic filler that is slightly darker in shade as the filler always lightens somewhat in drying. Press the filler firmly into the opening and build it up slightly above the level of the surface. When dry, a careful sanding will remove the excess without discoloring the stained surface. The amateur can save much time and work in the final finishing of a surface if he uses a spirit varnish, which dries quickly. Spirit varnish, sold under different trade names, is a satisfactory substitute for either shellac or varnish. It is a thin, elastic product which levels easily and dries dust free in about a half hour. In four or five hours, or overnight, one can sand it and apply the final finish coats of furniture wax to complete the job. It is equally as valuable as an undercoater for high-varnish finish. As a rule lacquers are unsatisfactory for repair work, owing to the difficulty of proper application, and they cannot be used at all on a surface that has been varished.

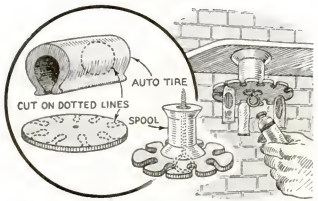
Veneered surfaces are easily repaired if the pieces broken away have been saved. Simply coat the underside with a quick-setting glue, replace the loose pieces and weight them until the glue is dry. The marks left by a coarse-mesh cloth on a table top where a heavy vase or other object has been for some time can be removed easily by the polishing methods described.

A warm flatiron and a damp cloth will raise many shallow dents; the moisture penetrates the wood, causing it to swell

Colored stick shellac can be melted with a soldering iron or heated screwdriver to fill deep dents

¶A few drops of boiled linseed oil rubbed into the hands before working on your motor will do much to keep them free of grease and dirt, and a few drops rubbed in after working will loosen the dirt so that it can be washed off.

Circular Rack of Rubber Holds Collapsible Tubes



Held by Notches in Edge of Rubber Disk, Toilet Preparations in Tubes Are Always at Hand

Many toilet preparations such as tooth paste, creams, lotions, etc., that are sold in small collapsible tubes, can be kept at hand where needed on a simple circular rack attached to the underside of a shelf. It consists of an ordinary spool and a disk of fairly heavy rubber such as you can cut from the side of an old auto casing. Notches are cut in the edges of the disk to take the necks of the tubes. A small hole in the center of the disk admits a screw eye which should be long enough to pass through the spool and is then driven into the shelf as shown.

¶When banking your furnace fire for several hours, alternate bunches of newspapers with layers of coal; the papers will blaze at intervals and help keep the checked fire from getting too low.

400 BLUEPRINTS for Spare-Time Profits

17 by 22-in. Blueprints Convenient for Shop Use

Why not get some new ideas from this valuable assortment of workshop plans that show just how many novel and useful articles are made. Unusual knickknacks are always in popular demand and can be sold at roadstands and through novelty stores. Whether you have only a few hand tools or a motorized shop, you will find something to suit your purpose in our free list of 400 prints. Just enclose 3 cents to cover mailing costs. Here are just a few of the many projects.

NOVELTIES

DOLL HOUSE—41x23x24¾. 507 and 508—50c.

SPIRAL CANDLESTICKS—Unusual artistic design, maple, lathe and hand work. 624—25c.

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WINTER SPORTCRAFT

FRONT-STEERING, NON-TIP ICE BOAT—Described in this issue. 786—25c. Other designs available.

HOMEMADE SNOWSHOES—Shows how to bend frames and string with rawhide. 796 and 797—50c.

AIR-PROPELLED ICE SPEEDSTER—Has motorcycle power plant and a streamlined canvas-covered body. 785—25c.

FAMOUS MODELS

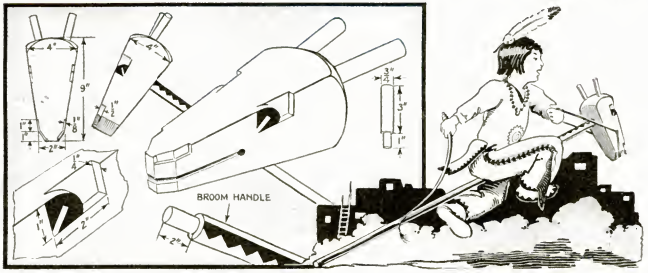
"HALF MOON"—Model of ship used by Hudson in early 1600's. 4 prints, 717 to 718a—$1.00.

"U.S.S. PENSACOLA"—Midget copy of 10,000-ton cruiser. All details to scale. 863 and 864—50c.

Blueprints are 25 cents each or six for $1.00. Address Blueprint Department, Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

18-Ft. Iceboat (SN 774)

Realistic Head on Child's Broomstick Horse



For chasing imaginary Indians, this broomstick horse will please your youngster. The head is sawed from a wood block and is rounded at the top and drilled for large dowels, which serve as ears. Nostrils are simulated by recesses in the upper edges of the nose and the mouth is a groove around the end and sides, while the eyes are made as shown in the lower left-hand detail. The body, of course, is a broom handle with the mane painted on the upper end. As a realistic touch, paint the mouth and nostrils red and the eyes black and white.—Bob Hofsinde, Chicago.

Shooting Home-Movie Title against Action Background

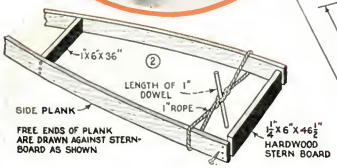
Titles with real-action backgrounds for home movies can be had by painting the title in bold, white letters on a sheet of Cellophane, which is then held between the camera and the scene. The Cellophane is placed between two cardboard frames clipped together at the corners to hold them and the assembly is slipped into a wood frame, which is supported on a standard. After the title has been shot, it is removed and the scene continued. Or, if you wish, the bottom of the frame can be left off so that the title can be slowly raised as the scene continues. The size of the title is best determined by experiment and should be at least 2 ft. in front of the lens for a camera of the fixed-focus type, using the portrait lens, while for cameras of the focusing type, it will be necessary to experiment to get the correct distance. Care should be taken to have the lens centered in the title, which must also be parallel with the front of the camera. Scenes consisting mostly of dark and gray tones will be found best for title backgrounds. If white backgrounds are tried, the title lettering should be done in black.—Joseph Mascelli, Albany, N. Y.

BP786

X346A

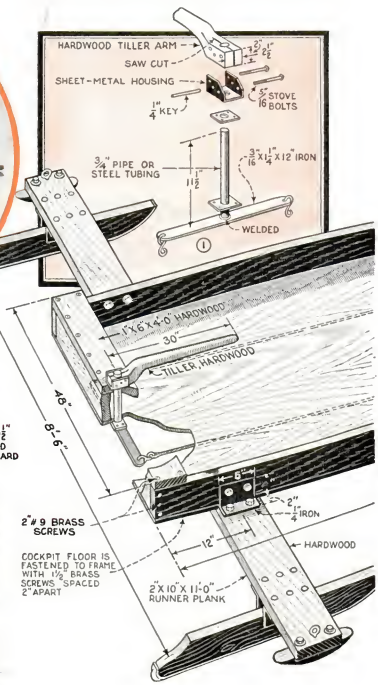
Build and Sail this Safe

By
JULIUS FANTA



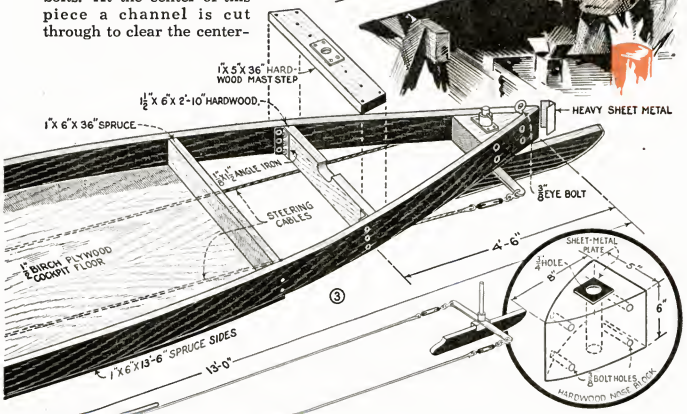
ICE-BOATING has been made safer with this non-capsizing, front-steering skeeter which holds a true course on the straightaway and eliminates spinning on the turns. Buffers or skids on the ends of the runner plank contact the ice when the boat tips, allowing the craft to skid sideways without upsetting.

All materials, including a sail of 75 sq. ft., will cost about $35. Begin work by beveling the ends of the two side planks and joining them to a hardwood nose block with four 3/8-in. bolts as in Fig. 3. Clear oak may be used for all parts designated as hardwood. Measure **6 ft. from the nose** along the side planks **and at this point,** join the side members to a cross beam or spreader. Pull the free ends of the side planks together with a rope as in Fig. 2 and join to the hardwood sternboard with screws. Before releasing the ends, screw on the hardwood top board. Turn the hull



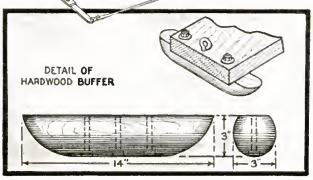
Front-Steering ICE BOAT

thus assembled upside down and fit the cockpit floor, which is ½-in. birch plywood. Fasten this to the frame with No. 8 flat-head brass screws, 1½ in. long and spaced 2 in. apart. Next, fit the mast-step support, reinforcing the corners with angle brackets bent to a snug fit and joined with stove bolts. At the center of this piece a channel is cut through to clear the center-

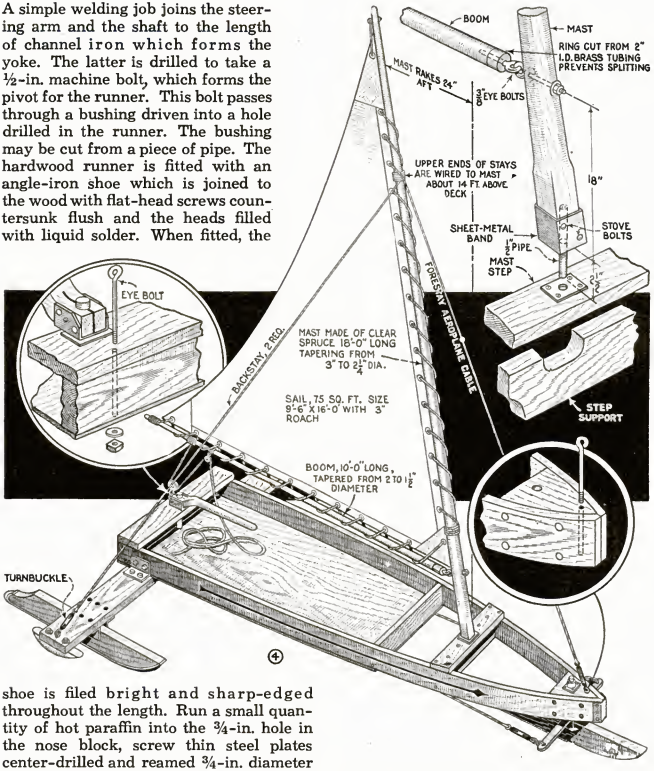


ing pin in the mast. Drill a ⅝-in. hole through the hardwood mast step and screw it to the support and side planks as shown. Drill a ½-in. hole through a ⅛ by 3 by 5-in. piece of flat iron and fasten to the step with screws. The plate prevents the mast wearing away the step. To complete the hull, fit the metal nose cap shown in Fig. 1. It may be cut and bent from heavy sheet brass and is screwed on.

Fig. 5 details the complete assembly of the front runner which acts as the rudder.

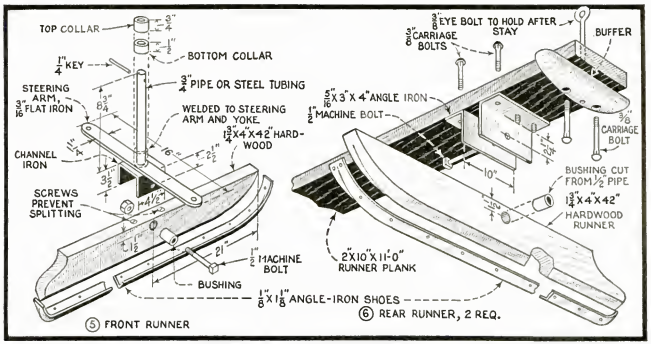


A simple welding job joins the steering arm and the shaft to the length of channel iron which forms the yoke. The latter is drilled to take a ½-in. machine bolt, which forms the pivot for the runner. This bolt passes through a bushing driven into a hole drilled in the runner. The bushing may be cut from a piece of pipe. The hardwood runner is fitted with an angle-iron shoe which is joined to the wood with flat-head screws countersunk flush and the heads filled with liquid solder. When fitted, the



shoe is filed bright and sharp-edged throughout the length. Run a small quantity of hot paraffin into the ¾-in. hole in the nose block, screw thin steel plates center-drilled and reamed ¾-in. diameter above and below to provide bearing surfaces, and set the runner assembly in position with the ½-in. lower collar below and the ¾-in. collar on top. A transverse key holds the assembly securely in place. A light tap with a hammer on the upper end of the hollow shaft will bind the key and prevent its dropping out. Fig. 6 shows the construction of the rear runner.

Next, cut the runner plank from hardwood to the size indicated in Fig. 4, which clearly details the assembly of the after runner. Fig. 3 gives the distance between the runners center to center and also the size and shape of the buffers. The carriage bolts holding the buffer are countersunk below the surface; also the after-stay eyebolt passes through both the runner plank and the buffer with the nut countersunk below the surface. These holes should be filled with a plastic and planed smooth. Bolt the runner plank to the hull with 5/16-in. machine bolts through the angle-iron braces. Also, several bolts of the same

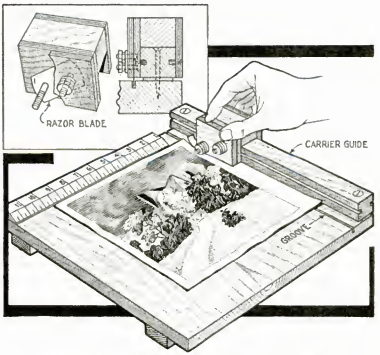


size may be put through the cockpit floor and runner plank. Build up the tiller as in Fig. 1 and assemble on the stern. Set the front runner straight ahead and attach the cables through turnbuckles at the front. Adjust both cables to a uniform tension.

Fig. 4 shows the details of the rigging, including the mast and boom. The mast is a simple tapering job with a plane and sandpaper. Spruce is the wood to use for both mast and boom. The lower end of the mast is left in the square and is housed with a band of heavy sheet metal to prevent splitting. One forestay and two after stays are used to hold the mast rigidly in the upright position. The 3/8-in. eyebolts at the bow and stern pass entirely through the frame. Finish all wood parts in the natural color with a thorough sanding and two coats of spar varnish.

Photo Trimmer Utilizes Safety-Razor Blade as a Cutter

For trimming photos and drawings, this trimmer is handy. Essentially it consists of a flat board with a ruler fastened along one edge to serve as a guide. The cutter is an old safety-razor blade mounted at an angle on a sliding carrier which is constructed as shown in the upper detail so that the blade will slide into a groove near the edge of the board and at right angles to the rule. Be sure to cut this accurately so that the blade runs free. The carrier is arranged to slide on a guide, which is screwed to the edge of the board and parallel to the groove for the blade. Similar grooves in each side of the guide take small screws or pins of the carrier permitting it to slide back and forth freely.



This Homemade Cutter Trims Photos and Drawings, or Cuts Large Sheets of Paper Accurately

Plumbers' Rubber Suction Cups Support Warning Flags around Holes in Ice-Covered Pond

Rubber Suction Cups Hold Warning Flags on Ice

While harvesting ice from a large pond, which was frequented by skaters, one man found that rubber suction cups, such as are used by plumbers, served nicely to support warning flags around holes where the ice had been removed. The handles were sawed off above the cups and then drilled in the ends to take the flag staffs. If the cups are warmed before setting them on the ice, they will melt it and then freeze fast.

Holder for Waste to Thaw Frozen Water Pipes

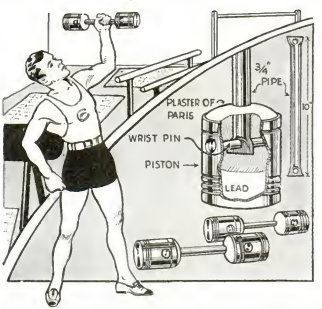
A coil spring from an old car seat or bed spring makes a good holder for waste that has been soaked in gasoline and ignited to thaw out frozen water pipes. Straighten one turn of the spring and insert it into a hole drilled in a stick to serve as a handle.—A. S. Wurz, Jr., Rockyford, Alta., Canada.

Separating Matted Bristles on Paint Brush

To separate the bristles of a paint brush that have become matted with dried paint, first soak them in gasoline or paint solvent and then rub them back and forth over a wire brush as shown. This will separate the bristles and is less injurious than pounding with a hammer, which is often done.

Dumb-Bells Made from Auto Pistons

Members of an athletic club who needed several pairs of dumb-bells made them from old auto pistons. Each pair consisted of a length of pipe and two pistons. The pipe was flattened at the ends and drilled to slip over the wrist pins, after which lead was poured into the pistons to give them the required weight. After pouring the lead, the pistons were filled with plaster of paris, which was rounded up around the pipe to protect the hands against the edges of the pistons. Dumb-bells of varying weights can be had by pouring the lead into pistons of different sizes.



Lead-Filled Auto Pistons Joined Together with Short Lengths of Pipe Make Good Dumb-Bells

¶To prevent corked bottles from leaking while traveling, apply a thick coating of melted paraffin over the corks after putting them in the bottles.

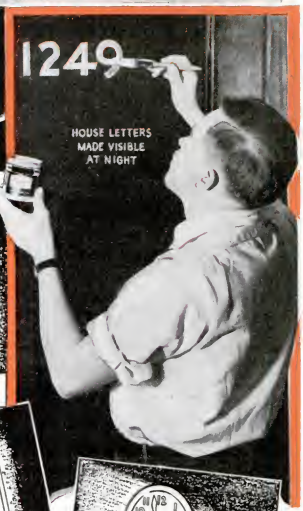
Hammer Laboratories, Inc
624 Monroe Central Savings Bank Bldg
Klenert Arts

Some Practical Uses of LUMINOUS PAINT

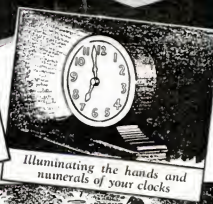
Keyholes and door-bell push buttons easily found in the dark if coated with luminous paint

Left, lowest tread of stairway, luminous at night, prevents stumbling Right, lighting outdoor pump on dark night

Signs and display cards in shop windows made noticeable



Switch plates in the house or garage given ready visibility



Illuminating the hands and numerals of your clocks

"Spotting" fire extinguishers and fuse boxes

At summer camps, visitors will be better able to find boat landings if coated with luminous paint

Radium Chemical Co. Inc 6 42nd St New York

Strobite Co. 35 W. 52nd New York.

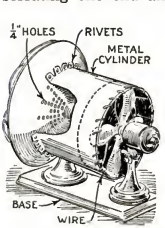
Neat Wire-Mesh Bags Fastened to Closet Doors for Holding Soiled Clothes

Soiled-Clothes Bags on Closet Doors Save Space

Instead of using floor space in bedroom closets to store baskets for soiled clothes, one woman in a small home fastened a wire-mesh bag on the inside of each closet door. Besides saving space, the bags tend to remind the young members of the family to put away their soiled clothes when they remove them.

Improving an Electric Heater

Here is a method of mounting a fan behind an electric heater to get a uniform distribution of heat. Drill several ¼-in. holes in the heater reflector as indicated, and rivet a sheet metal cylinder to it, first serrating one end and bending the tabs thus formed up against the reflector, to which they are riveted. Next mount the heater and fan on a base, placing the fan so that the guard fits snugly inside of the end of the cylinder. Then punch a row of small holes around the end of the cylinder and lace the guard to it with wire as indicated.—F. J. T. Hall, Chicago.

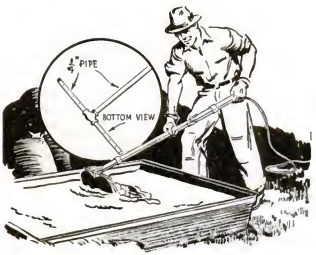


Coat Serves as Emergency Darkroom

If you are ever out with a camera and find it necessary to change films in the light, your coat will serve as an emergency darkroom provided it is made of closely woven cloth or lined with heavy material so that light cannot filter through it. Button up the coat and put the camera inside. Then tuck in the bottom, insert the hands into the sleeves and proceed as you would with a regular changing bag. If the sun is shining, stand in a shady place while making the change.—Sigmund Sameth, New York City.

Wetting Attachment for Mortar Hoe

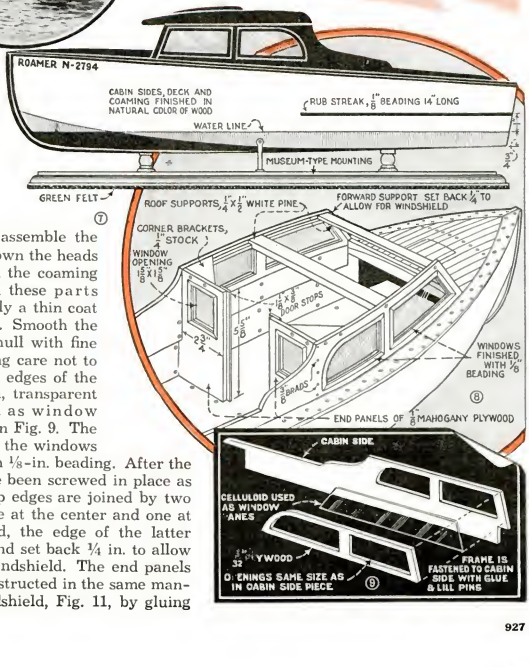
When mixing small batches of cement or plaster single-handed, this attachment on the mortar hoe for wetting the mixture will be found a timesaver. A length of pipe having a tee and two nipples at one end is attached to a garden hose and to the hoe handle. The open ends of the nipples are closed with caps, and small holes are drilled through the underside of each one to direct the water into the cement.



This Attachment on a Mortar Hoe Wets Cement or Plaster as It Is Being Mixed

The flow of water is controlled by a valve in the pipe.—A. H. Waychoff, Tempe, Ariz.

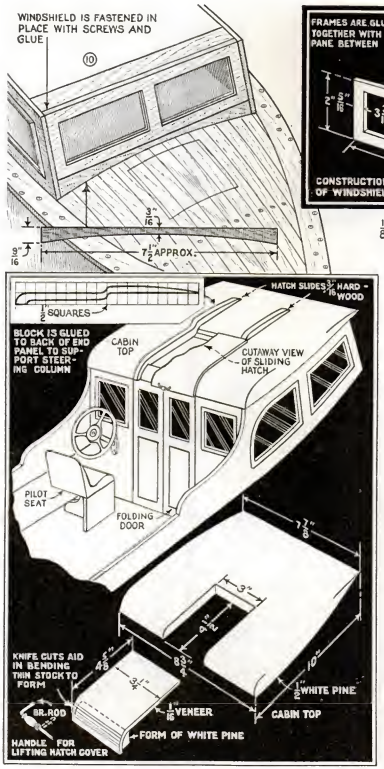
Building a Model of ROAMER



PART II

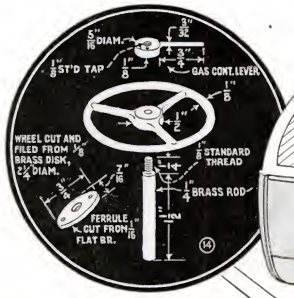
Cabin Construction and Finish

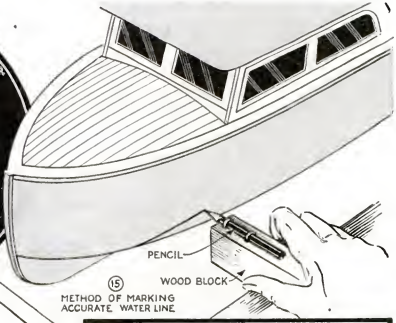
BEFORE you assemble the cabin, file down the heads of the screws in the coaming and deck. Sand these parts smooth and apply a thin coat of white shellac. Smooth the interior of the hull with fine sandpaper, taking care not to round the inner edges of the coaming. Thin, transparent celluloid is used as window glass as shown in Fig. 9. The outside edges of the windows are finished with 1/8-in. beading. After the cabin sides have been screwed in place as in Fig. 8, the top edges are joined by two cross beams, one at the center and one at the forward end, the edge of the latter being beveled and set back 1/4 in. to allow space for the windshield. The end panels in Fig. 8 are constructed in the same manner as the windshield, Fig. 11, by gluing



together two thicknesses of ⅛-in. mahogany plywood with the celluloid window light between them. These are joined to the sides with glue and brads and the corner is reinforced with a triangular brace as in Fig. 13. Door stops are glued to the inner edges and the window lights are finished with ⅛-in. beading. The length of the windshield, Fig. 11, is given approximately, as it must be trimmed to fit. A header or sill, Fig. 10, is cut to fit in the opening and curved to the contour of the deck. This is fastened with glue and No. 0 brass screws.

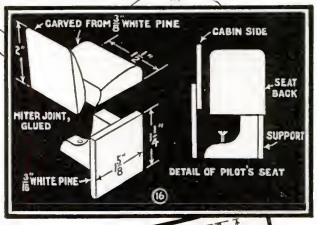
In making the cabin top, first glue two pieces together to get the required width. When dry, square up and cut the hatch opening, then lay the top on the cabin frame and mark for cutting. After cutting to size, spread glue and fasten the top in place with screws driven into the cross beams and corner braces. Countersink the screw heads so that the top may be planed and sanded to contour. Make and fit the hatch slides and hatch cover. Next, make the folding door as in Fig. 13. Before fastening the door, glue a small block to the back of the left end panel to support the steering-wheel column. Make a handle for the cabin hatch from No. 16 brass wire as in Fig. 12. Make and fit the steering wheel as in Fig. 14. The pilot's seat, Fig. 16, is fastened to the floor. Figs. 7, 17 and 18 detail a mounting having small hardwood turnings supporting the keel of the boat. Two metal braces, made as in Fig. 19, hold the

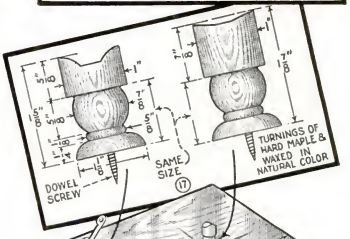




hull in place. The top end of the turnings is formed to fit the contour of the hull at the keel and a spot of glue on the tops of the turned supports together with the side braces, holds the hull securely in place.

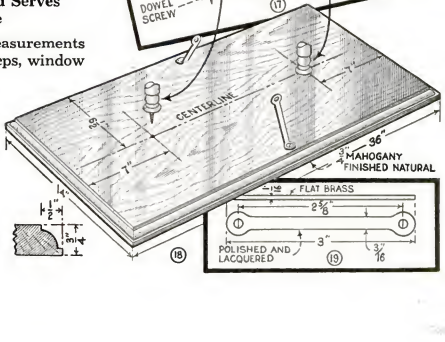
To finish, sand thoroughly and paint the entire hull below the coaming with two coats of flat white. Sand lightly between coats and follow with one coat of white enamel. Then mark the water line as shown in Fig. 15, and paint the surface below this with two coats of medium green. The projection of the stem takes the same color. The cabin top, the pilot's seat and the cushions of the rear seat are painted a dull black, and all mahogany parts are finished in the natural color of the wood with a coat of shellac and two coats of high-grade varnish rubbed down with steel wool.





Telescoping Curtain Rod Serves as Rule in Home

Obtaining the inside measurements of boxes, doorways, stair steps, window sash, etc., is not always easy for the amateur mechanic with the tools he has at hand. If a common, flat curtain rod of the telescoping type is available, the removal of the bent ends will leave a tool that is handy for this purpose. The flanges on the rod should be pressed down to hold the adjustment.



Large Bundles of Firewood Are Carried Easily with These Canvas Holders

Canvas Holders for Carrying Wood

Two strips of heavy canvas hemmed around the edges and around hand holes that have been cut near the ends serve nicely for carrying firewood. In use, the strips are spread out on the ground and the wood is stacked on top of them, after which the ends of each strip are folded up over the wood and gripped with the hands.

Bracket Holds Furnace Chain

Screwed to the baseboard, curtain-rod brackets of the type shown in the photo provide a neat holder for keeping furnace chain in its adjusted position. The prongs on these brackets are strong and are springy enough, when pushed together, to hold the chain and make it easy to remove for readjustment.

Substitute for Black Enamel

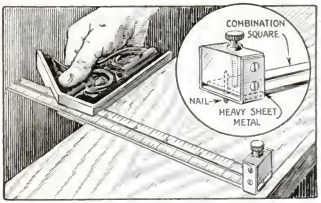
By thoroughly mixing equal parts of spar and asphaltum varnish, a good substitute for black enamel that is lasting and has a glossy finish can be produced. The spar varnish gives the mixture lasting wear and resistance to the elements, while the asphaltum varnish makes it proof against the action of acids and adds the intense black color.

Chalk Holder Made from Rubber Grip of Tricycle Handle Bar

To utilize short pieces of chalk, slip them in the end of a rubber grip as is used on handle bars of tricycles. If the chalk is used on blackboards or bulletin boards in public places, insert one end of a wire paper clip into the closed end of the grip so that it can be fastened to the board with a string. This helps to prevent the chalk and holder from being carried away by an occasional user.

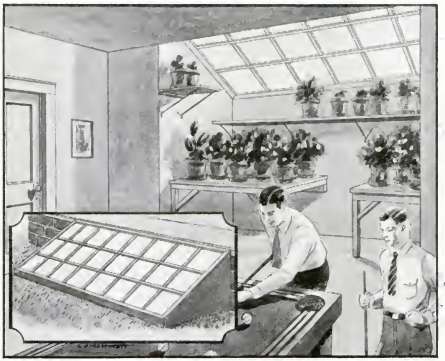
Adapter for Using Combination Square as a Marking Gauge

With this adapter, which is made from a small hardwood block and a strip of heavy sheet metal, you can use your combination square as a marking gauge. The metal is bent around the sides and bottom of the block and screwed in place, leaving a clearance at the bottom sufficient to fit the end of the square. A pointed nail in the bottom of the block near the edge serves as a scratcher and a thumbscrew clamps the block on the square.



Small Block with Pointed Nail in Bottom Converts Combination Square into Marking Gauge

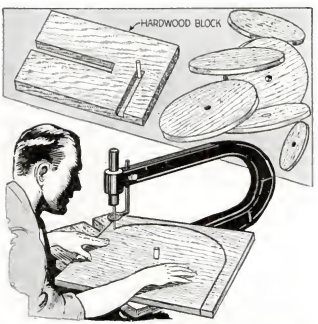
Small Conservatory Built in Your Basement



By extending part of the basement wall and roofing the opening thus formed with a sash, you will have a conservatory, and, at the same time, provide plenty of light in the basement. A portion of the basement wall is removed and dirt taken out to make the size of conservatory desired, after which the recess thus made is walled up with concrete, sloping the ends from the top of the house foundation to the ground. The window should be fitted tightly to the concrete walls to keep out wind and water. This can be done with weather stripping and wood framing, or a rabbet to take the frame can be made in the inside edges of the walls when pouring the concrete. The cracks around the frame can then be sealed with putty or with strips of felt and roofing tar.

Improved Attachment for Cutting Disks on a Jig Saw

With this attachment, disks from 2 to 24 in. in diameter can be cut accurately on a jig saw. The attachment is merely a hardwood block with a slot and a groove cut in it as indicated, the block being about as wide as the saw table and a little longer so that it can be fastened in place with a C-clamp. The slot takes the saw blade and the groove, which is cut at right angles to the slot and terminates in a hole drilled in line with it, serves as a guide in alining a pivot pin in the center of the work with the saw blade. If it is not desired to drill the work for a pivot pin, a small block with a sharp-pointed nail to engage the underside surface of the work can be used instead. Moving the attachment to the right or left determines the size of the disk to be cut.—Otis S. Sawn, N. Arlington, N. J.



Attachment Enables You to Cut Accurately Disks with Radii from 2 to 24 In. on a Jig Saw

Tin Plating Small Objects

Screws, small machine parts or other items that must be protected from rust and corrosion may be given a resistant, bright tin plate by boiling them for 45 min. in a solution made by dissolving aluminum sulphate, 1 oz., cream of tartar, 1 oz., and tin, ¼ oz., in water, ½ gal. The boiling should be done in a zinc container. After removal from the bath, the plated ware should be dried in sawdust. Rubbing with fine sawdust produces a brilliant polish.

MAKE YOUR OWN

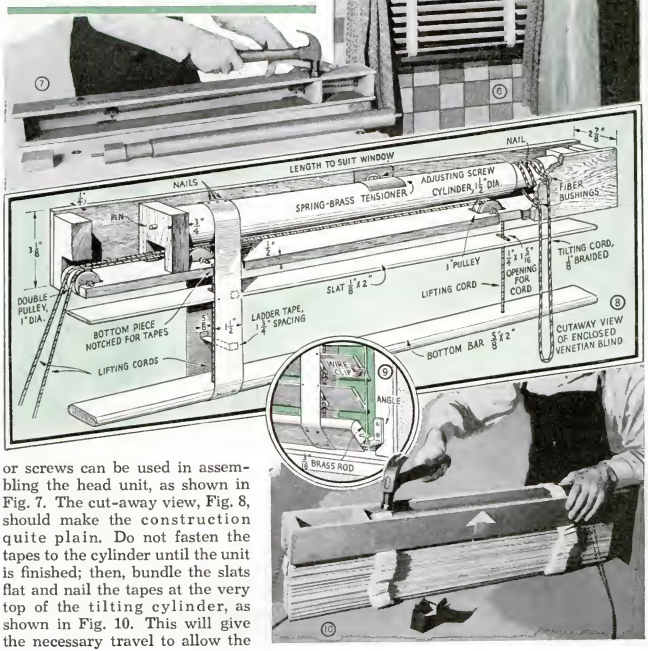
CONTROLLED light and smart appearance make Venetian blinds desirable for home windows. Each blind consists of a number of horizontal wooden slats, suspended by cords and tapes from a heavier top bar. The blind can be raised entirely—bundled—by pulling on the lifting cords, and the slats can be tilted to any degree by manipulating the tilting cord.

The simplest form of Venetian blind is shown in Figs. 2, 3 and 4. Make the slats first. They are ⅛ in. thick by 2 in. wide and are to be spaced on 1¾-in. centers, and a sufficient number must be made to span the distance from the sill to the top of the window. Fig. 1 shows the cord holes being routed on the drill press. A jig is necessary here in order to keep the openings absolutely uniform. Use a ¼-in. bit, making the slots about 1⁵⁄₁₆ in. long. The tape that supports the slats is edge-nailed to each slat with ⅜-in. wire nails, as shown in Fig. 5. Here, again, a jig is necessary to keep the pieces perfectly in line. You will notice that there are no bearings, the lifting cords working on bare wood at the end bracket, and through fiber bushings on the tilt bar. It is impractical to use pulleys on the tilt bar when this is used for both tilting and support, as it is in this case, but a double pulley on a bracket can be used at the bracket if desired. With this refinement, and the use of ladder tapes (these can be purchased or sewed up to fit) instead of nailed tapes, this simple form of blind makes a very

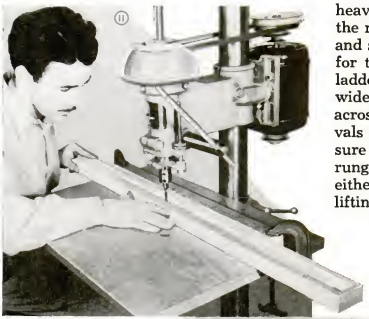
VENETIAN BLINDS

good unit for small windows. Detail B shows a simple form of tensioner which consists of a heavy screw working against a lock washer or a spiral of spring brass. The screw should be turned in just far enough to get the required tension to hold the tilt at any position after it has been set by manipulating the tilting cord.

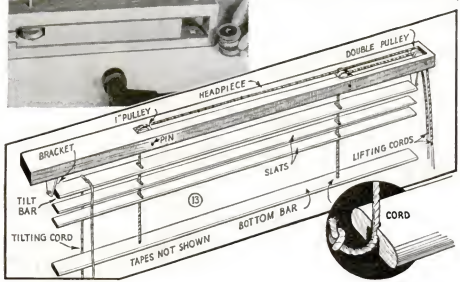
Figs. 6 to 10 show a blind which is quite a bit superior to the one just described, both in appearance and operation. The lifting cords work over pulleys, and the tilting cylinder is entirely enclosed. Nails



or screws can be used in assembling the head unit, as shown in Fig. 7. The cut-away view, Fig. 8, should make the construction quite plain. Do not fasten the tapes to the cylinder until the unit is finished; then, bundle the slats flat and nail the tapes at the very top of the tilting cylinder, as shown in Fig. 10. This will give the necessary travel to allow the



heavier than the specified ⅛ in. In width, the regular sizes are either 2 in. or 2⅜ in., and standard ladder tapes can be fastened for these sizes. If you sew up your own ladder tapes, make them about 1½ in. wide, with rungs of ⅝-in. tape sewed across at 1¾-in. intervals (2⅛ in. intervals if 2⅜-in. wide slats are used). Be sure to allow for a little play across the rungs. It is best to stagger the rungs on either side of the wider tapes, running the lifting cord down through the center. All cords should be ⅛-in. braided cord, and it should be glazed to minimize wear. Slats should be painted or lacquered, and a very smooth job is essential. The headpiece is often stained and varnished to match the woodwork on which it is to be used. For typical frame construction, slats to assume any angle. The lifting pulleys can be turned from hardwood, or you can purchase steel pulleys of the same size. The shafts ride flush on the top of the bottom board, and are held in place by pins or staples. Any form of Venetian blind is best worked on some form of guide, such as shown in Fig. 9. The twisted wire clip is fastened to every, say, sixth slat, engaging the metal rod which runs up each side. In some types of blinds, every sixth slat is made ⅜ in. thick instead of ⅛ in., allowing the insertion of a screw eye instead of the wire clip.

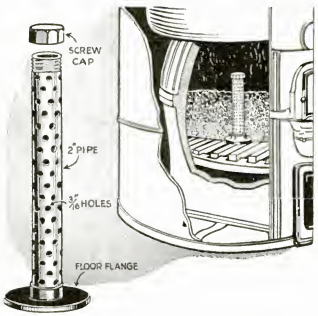


A third type of blind is shown in Fig. 13. The headpiece for this is routed on the drill press as in Fig. 11. This blind is somewhat on the order of the one first described, but differs in that it uses a headpiece to carry the pulleys for the lifting cords. The tapes, which are not shown, are standard ladder tapes, fitted as already described. Regardless of the blind you make, certain specifications as to materials should be followed. Use a soft, light wood for the slats, such as basswood, white pine or spruce. Do not make the slats any the slats should be of a length to overlap the casing about 1 in. on either side. Where the window is deep enough, the blind is best fitted inside the case, allowing about ½ in. play at each end.

Waterproofing and Strengthening Cord

Heavy cord and light rope may be improved greatly in strength and made waterproof by impregnating it with a thick solution of celluloid scraps dissolved in acetone. The twine should be run lightly through the fingers to remove the surplus solution before hanging it up to dry. Any color of alcohol-soluble aniline dye may be added to the acetone.

Suggestions That Help in Firing Your Furnace



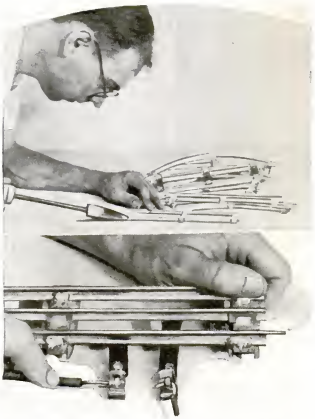
When burning buckwheat coal in your furnace, explosions caused by trapped gases, after the fire has been banked, may be avoided by setting a perforated pipe in the center of the bed. Get a suitable length of 2-in. pipe and drill small holes through the wall. One end is fitted with a flange so that it can be set on the grate. The upper end is closed with a cap. The length of pipe should be such that the top portion will extend about 5 or 6 in. above the banked bed of coal, and its purpose is to conduct air from the ash pit to the space above the fire. This provides sufficient draft to carry away combustible gases, besides helping to supply air to the coal on all sides to avoid "dead spots." Opening the furnace door when firing often allows smoke to get into the basement, but a sheet-metal hood fitted to the furnace directly above the door, and connected with stovepipe to the chimney, will be found an effective cure. A damper should be installed in the stovepipe and should be kept closed when not firing in order to prevent loss of draft through the furnace.

Ax Serves as Rest for Starting a One-Man Saw into Tree

When felling a tree with a one-man crosscut saw, a single-bit ax will be found handy as a rest for starting the saw at right angles to the tree, which is desirable to prevent the saw from binding as it cuts. The blade of the ax is merely driven into the base of the tree at an angle with the handle resting on the ground. This can be done by tapping the heel of the ax lightly with a splitting maul or a heavy hammer. —G. E. Hendrickson, Argyle, Wis.

Single-Bit Ax Supports Blade of One-Man Saw While Starting the Cut to Fell a Tree

When sawing spring or tool steel with a hand hack saw, take very short strokes near one end of the saw; this method, besides making the saw cut fast, saves most of the cutting surface of the blade for another job.



Soldering Model-Train Track to Make It Rigid and Prevent Ends of Rails from Spreading Apart

Suggestions for Improving Model-Train Track

If the underside of each rail of model-train track is soldered near the ends, the rails will not spread apart but will provide a tight fit for the connecting pins. Also, drops of solder applied at the points where the rails are clamped to the ties, will make the track rigid. Another improvement that will permit the track to lie flat on the floor is to use short sections of radio lead-in strips as electrical connectors. Cut the strip in half. One end of each piece is soldered to a rail and the other, which has a spring clip, makes it easy to attach the wires.

Sandpaper Strips Backed with File

A handy sanding jig can be had by stretching the desired grade of sandpaper over a file as indicated. The outer end of the paper is held with a large paper clip, while the other end is held with the hand. This method of providing a backing for abrasive paper gives a sanding stick on which the grades of abrasive can be quickly changed as desired to suit almost any type of work at hand.—Ray J. Marran, Kansas City, Mo.

Heavy Boxes Moved on Bottle Caps

Bottle caps provide excellent gliders on which to move heavy boxes over concrete floors. To do this, pry up each corner of the box and place a cap under it. The crimped edges of the caps will penetrate the wood and prevent them from slipping.

Determining Pitch of Roof with a Ruler

When estimating the cost of repairing or remodeling a building, which requires that the approximate pitch of the roof be determined, carpenters often use a folding rule. One end of the rule is folded to a triangular shape, after which it is held in front of the eyes back some distance from the building. Then by sighting through the rule as indicated by the dotted lines, it is set to conform to the slope of the roof. If the rule is adjusted to the proper angles, it is an easy matter to determine pitch of the roof.—G. E. Hendrickson, Argyle, Wis.

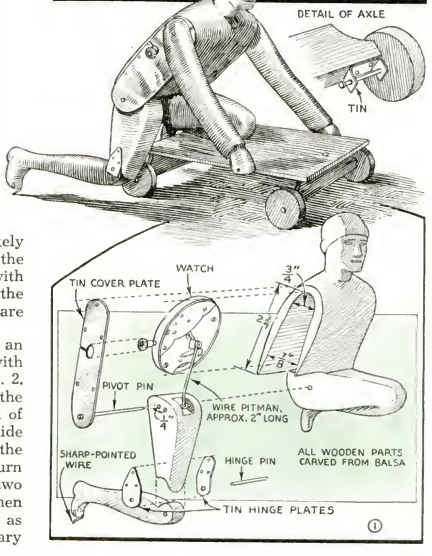
Pitch of a Roof Can Be Closely Estimated from the Ground by Using a Folding Rule

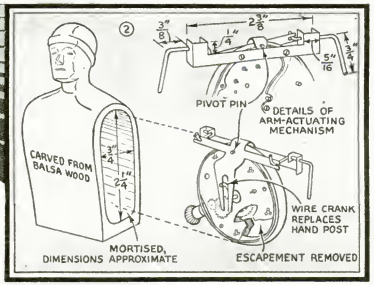
Watch-Driven TOYS

By A. J. HONGO

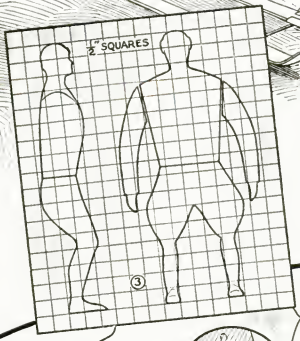
HERE are some new and novel designs of animated toys that you can easily make from a few scraps of balsa wood, small pieces of tin, wire and brads and a discarded watch, which supplies the motive power. First, remove the escapement wheel and rack from the watch so that when the main spring is wound tight the mechanism will run freely. Next, take out the post carrying the hour and minute hands and substitute a stiff wire, bent to form a crank of approximately $\frac{3}{8}$-in. throw. Note that in the dragon the watch is fitted with two cranks at 180° while the cranks driving the rowboat are made to revolve as one.

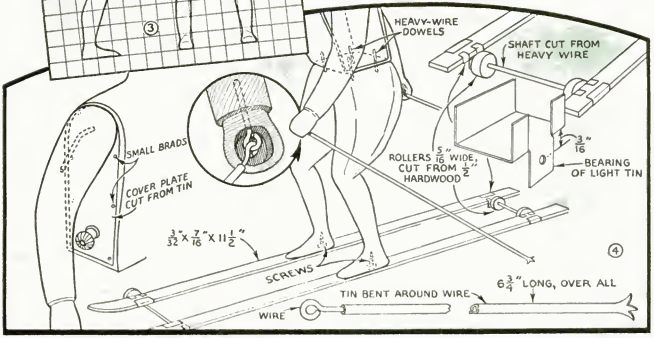
Taking the man on skis as an example, first fit the watch with the mechanism shown in Fig. 2. A single crank is mounted in the hand post and the outer end of the driving crank engages a slide cut from tin and pivoted to the frame of the watch. This in turn imparts a rocking motion to two short arms of heavy wire. Then lay out and carve the figure as in Fig. 3. It may be necessary

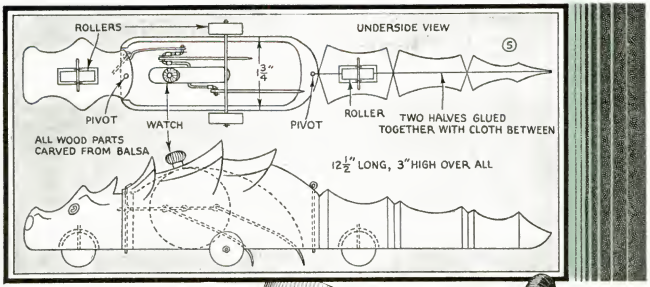




to change the dimensions of some of the parts from those given as watches vary in size. Mortise the body of the man clear through and fit the watch assembly in place. Cover the openings at either side with plates cut from light tin, holes being punched in the plates to allow projection of the stem wind of the watch and the swinging arms. Carve the arms as in Fig. 4. Each arm is bent slightly at the elbow and the hand is hollowed. A wire eye is forced into a small hole drilled in the palm. The arms are then forced tightly onto the swinging wires. Next, attach the skis as in Fig. 4, and then make and fit the small rollers. Attach the ski poles to the wire eyes in the hands.





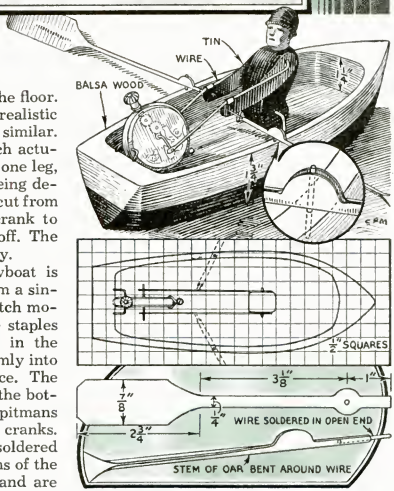


When the watch is wound and the toy placed on the floor it will be moved forward by the ski poles, the sharp points of which engage the floor.

The boy on the wagon is also a realistic toy, the construction of which is similar. See Fig. 1. The crank on the watch actuates a pitman which is attached to one leg, the correct length of the pitman being determined by trial. A small washer cut from tin is riveted on the end of the crank to prevent the pitman from working off. The pivot at the knee must work freely.

The construction of the rowboat is shown also. The hull is carved from a single block of white pine and the watch motor is mounted in the stern. Wire staples are passed through holes drilled in the frame of the watch and pressed firmly into the hull to hold the watch in place. The half figure of the man is hinged to the bottom of the boat and long wire pitmans extend from the shoulders to the cranks. Pieces of tin are cut to shape and soldered to the pitmans to represent the arms of the figure. The oars are made of tin and are hinged to the pitmans at the center and also pivot on oar locks on each side of the boat. When the watch is wound the revolving cranks impart a rowing motion to the oars and figure.

The dragon toy is detailed in Fig. 5. The tail is built up in three separate sections, each consisting of two halves glued together with a strip of heavy cloth between. This is attached to the body by looping the free end of the cloth around a pin made of wire and forcing this into a slot cut in the body. The head pivots on a vertical pin



and a second pitman from an eccentric on the outer end of the driving crank imparts a sidewise motion to the head as the toy moves forward. Short lengths of stiff wire fastened to the cranks and filed to a sharp point at the free end engage the floor or carpet and move the toy forward when the watch is wound, an opening in the lower side of the body allowing these parts to move freely. The entire assembly is carried on small rollers as shown. The toys are painted in bright, contrasting colors.

Kerosene for Kindling Fire Applied with Rubber Bulb Used to Fill Batteries

Handy Outfit for Kindling Fires

If you are in the habit of kindling a fire in your stove with kerosene, a rubber bulb, such as is used to fill storage batteries, is handy for applying the kerosene. Still better, keep the bulb in a screw-top container filled with equal parts of kerosene and used crankcase oil. This mixture is not as explosive as pure kerosene and burns longer.

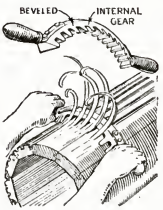
Small Perforated Can Permits Use of Paint with Skins

When small particles of the skin that often forms on top of a bucket of paint accidentally get mixed with it so that they are picked up by a brush, suspend a perforated can inside of the bucket with wires. The perforations will permit the paint to enter the smaller can but will keep out the skin particles. The paint brush can then be dipped into the can as shown in the illustration.

¶A skilled baker says the secret of making flaky doughnuts is to add a tablespoonful of paraffin to the boiling lard in which the dough is cooked.

Fluting Tool Made from Half of Old Gear

For fluting large round work, such as porch columns, a good tool can be made from a section of an internal gear by beveling one edge of the teeth as shown and riveting handles to the ends. When selecting the gear, be sure its inside diameter is approximately the same as the outside diameter of the work, otherwise the flutes cannot be cut uniformly. The spacing of the flutes, of course, depends on the number of teeth in the gear section, every other one of which can be broken out if necessary.—A. H. Waychoff, Tempe, Ariz.



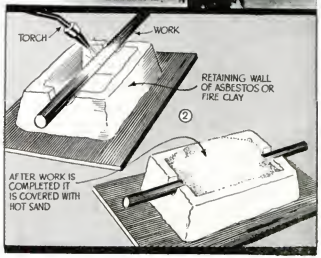
Sandpaper Makes Non-Slip Patterns for Cutting Quilt Blocks

Instead of using a cardboard pattern when cutting quilt blocks, use one made from coarse sandpaper. This is placed on the cloth to be cut with the sanded side down so that it will not slip.—G. E. Hendrickson, Argyle, Wis.

Patterns Made of Sandpaper for Cutting Quilt Blocks Will Not Slip on the Cloth

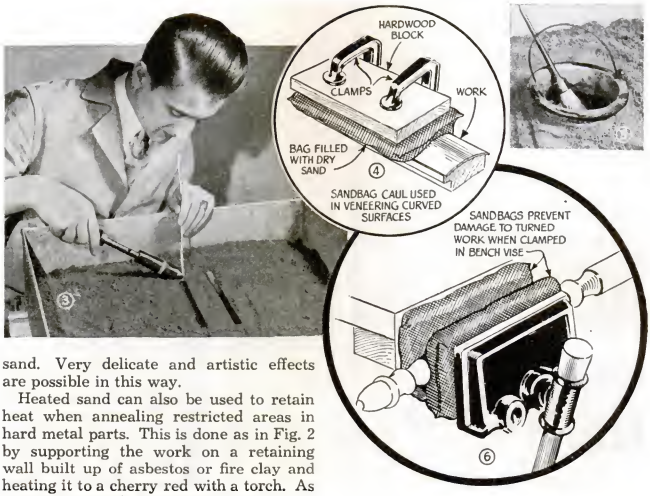
What You Can Do with SAND

YOU will find frequent use for a small quantity of clean, dry sand in your workshop. For example, it may be necessary to make a uniform bend in a length of small pipe or tubing. If you fill the pipe or tubing with dry sand and cork the ends, the pipe may be bent easily without any danger of collapsing at the bend. Small metal parts that are difficult to hold in any other way can be embedded in a tray filled with clean sand and soldered easily, Fig. 3. To obtain uniform heating of larger parts embed the parts in sand placed in a metal tray. The tray can be heated over a Bunsen burner or any other means at hand. The sand holds the work in place and aids in keeping the necessary uniformity of heat while soldering.



If you wish to keep a liquid warm or hot for a considerable length of time without heating it over an open flame, pour the fluid in a suitable container and embed it in hot sand as in Fig. 5. When it is desired to retain the heat of liquids that have been warmed over an open flame, fill a jar, or any container that will not leak, with hot sand and set it into the solution.

Hot sand is used to obtain the beautiful shaded effects so often seen in marquetry inlaying. The piece of veneer to be shaded is pushed edgewise into the hot sand and left until the desired shading is obtained. The wood will be darkened most at the point farthest beneath the surface of the



sand. Very delicate and artistic effects are possible in this way.

Heated sand can also be used to retain heat when annealing restricted areas in hard metal parts. This is done as in Fig. 2 by supporting the work on a retaining wall built up of asbestos or fire clay and heating it to a cherry red with a torch. As soon as the work is brought to the proper degree of heat, the space enclosed by the wall is filled with hot sand, which allows the work to cool slowly.

A heavy cloth or canvas bag filled with wet sand and strongly sewed, makes a good dolly for removing dents from auto fenders as shown in Fig. 1, using either a wooden or rawhide mallet. Two other practical uses of small sandbags in the workshop are shown in Figs. 4 and 6. One is used as a caul when veneering a small curved surface. Due to its flexibility, the sandbag is a means of applying equal pressure over a curved surface. Turnings or other irregular work can be held in the bench vise without damage when clamped between two sandbags.

Novel Method of Checking Up on Honey Produced by Bees

One apiarist who wished to know approximately the weight of honey in each one of his bee hives at various times, rigged them with a pointer and a scale calibrated in pounds. To do this, each hive, when empty, was mounted on coil springs taken from an old auto-seat cushion, a spring being placed under each corner of the hive. A stake was then driven into the ground near the hive and a pointer was screwed to the corner. To calibrate the stake or scale, 1-lb. weights were placed on top of the hive, one at a time, and the divisions marked on the stake.

Carrying Extra Hack-Saw Blades

When you go out on a job with as few tools as possible to do the work, an extra blade for the hack saw can be carried conveniently without losing it by binding it to the saw frame with tape. A still better method is to use wide rubber bands as a substitute for the tape so that the holder thus formed is always at hand when needed, permitting quick removal or replacement of the extra blade.—Roger C. Dickey, Salem, N. H.

Metal Colored with Chemicals and Dry Cell

By a simple electrolytic process, using one or two dry cells and a chemical solution, small metal objects may be given various colors and hues up to a deep black. First make the solution by dissolving as much stick caustic soda in a test tube of distilled water as the latter will absorb, heating the water as the soda is added. To this, after pouring it into a beaker, add distilled water to get enough fluid so that the object to be colored can be completely immersed, and then, while boiling over a flame, dissolve in it all the litharge it will take, adding a little at a time. After pouring the solution into a mason jar, suspend a small piece of lead and the articles to be colored in it with a couple of copper wires, connecting the one fastened to the lead to the negative terminal and the other to the positive terminal of the dry cell. When the parts have been colored as desired, remove them and rinse.

A Small Rubber Tube Helps Empty Large Jugs Quickly

When rinsing a number of large jugs the water can be drained from them in half the time it usually takes by inserting a small rubber tube as shown. This allows air to enter, preventing the formation of a vacuum in the bottom. The tube is also handy when pouring the contents of a jug into a small-mouth container as it allows the liquid to come out in an even stream, which can be directed easily into the mouth of the container. A brass or copper tube will also do, provided the jug does not contain an acid.

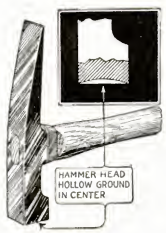
Hinged Front on Manger Opens for Cleaning to Prevent Rats Harboring in Chaff

Front of Horse Manger Opens for Cleaning

Horse mangers that are constructed with tight-fitting boards usually accumulate dirt and chaff which harbors rats and mice. To eliminate the rodents, one farmer built gate fronts to each manger as indicated. These were made of boards spaced two or three inches apart and supported by hinges at the top so that they could be opened for an occasional cleaning.

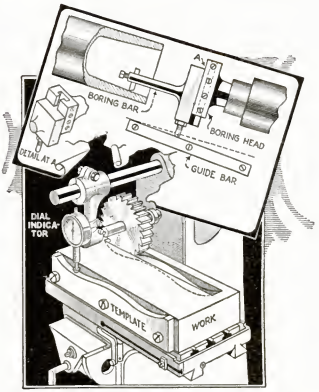
Hollow Grinding Head of Bricklayers' Hammer to Keep Edges Sharp

After a bricklayers' hammer has been used a short time, the edges become rounded and will not split the bricks properly unless the head is ground down frequently. I have found that by grinding the hammer hollow as shown, instead of flat, the edges stay in condition longer.—Teofil Kornylak, Jersey City, New Jersey.



Two Kinks That Help Operators of Milling Machines

Here are two kinks that operators of milling machines will find handy. In the upper detail is shown a method of boring tapered holes. A guide bar is clamped to the machine table at an angle corresponding to the desired taper of the hole. The boring head, which is one generally used for facing work in a drill press, has a boring bar fitted to it. The head is provided with a hardened contact piece, which strikes on the guide bar at each revolution of the spindle and causes the boring tool to feed into the work at the same angle at which the bar is set. In the lower detail is a set-up for contour milling that eliminates much filing and chipping, which must be done unless the work can be machined. A template corresponding to the desired contour of the work, is fastened to it as shown, after which a dial indicator is fastened to the milling arm to rest on the



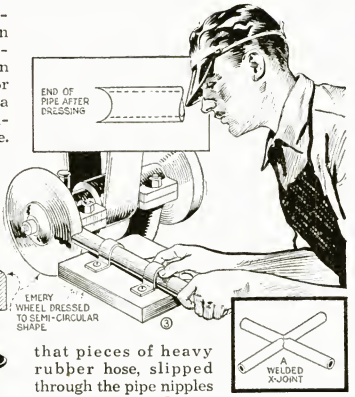
Set-Ups for Contour Milling and for Boring Tapered Holes on a Milling Machine

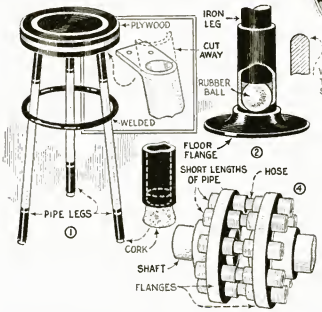
template. The long power feed is used, and the table is raised or lowered to keep the indicator hand at zero.

A good ferrotyping solution for glossy prints consists of thin, high-grade machine oil, 10 drops, and denatured alcohol, 1 pint.

Welded Pipe Serves Many Uses in the Shop

Many things can be made of pipe by assembling the parts and welding them in cases where standard fittings do not always lend themselves to the construction desired. To fit pieces of pipe together for welding, you will find it handy to use a grinding wheel as wide as the pipe diameter, dressed down to a semi-circular face. The end of the pipe can then be ground to fit as in Fig. 3, using a jig which consists of a wood block having two pipe straps through which the pipe

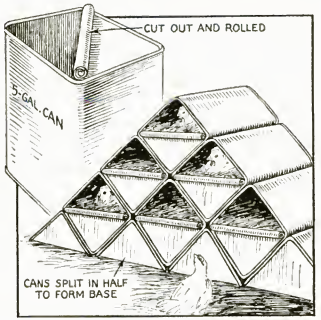




can be slid against the wheel. A shop stool for use where there is much vibration is shown in Fig. 1, cork or rubber feet being inserted into the lower ends of the legs. Bottle corks can be used for this purpose. Short pieces of flat iron are welded to the upper ends of the legs as indicated, and are drilled for screws to permit attachment of a plywood seat, after which a pipe ring or iron band is welded to the legs for reinforcement. Fig. 2 shows a single-leg stool that will absorb vibration, the leg fitting in a sleeve which is held by a floor flange, a rubber ball inside the sleeve taking the entire weight. A strong, flexible coupling may be made up from short lengths of pipe and heavy rubber hose. After alining the two shafts, a flange is fastened to the end of each, the flanges having previously been drilled for short pieces of pipe, which are welded in place. Both flanges must be made identical so that pieces of heavy rubber hose, slipped through the pipe nipples will connect the flanges together to form a coupling. The strain of the driving shaft is equally distributed over all the connecting pieces of hose.

Hens' Nests Made from Tin Cans

Good hens' nests can be made by stacking square, 5-gal. cans as shown, first cutting the tops so that the cut section can be rolled toward the center to provide entrances. Two of the cans cut in half diagonally provide a suitable base for six nests.



Using Old Auto Axle and Hammer to Spread Drag Teeth of Crosscut Saw

Old Auto Axle Used as Saw Swage

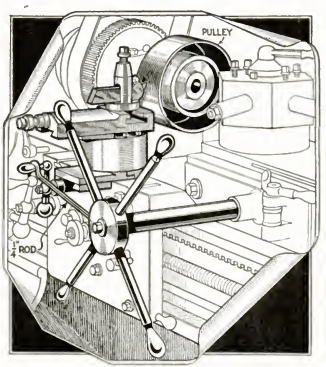
In the absence of a swage for spreading the drag teeth of a crosscut saw, use a hammer and an old auto axle as indicated instead of a hammer alone, which is often done. By using the axle, the teeth are less likely to be broken off and you can get them spread more uniformly.—J. A. Holloway, Montesano, Wash.

Wire Straightened with Bent Metal Tubing

A method which I have used for straightening wire rapidly without a machine, is to use a short scrap length of metal tubing having an inside diameter somewhat larger than the diameter of the wire. The wire is threaded through the tubing sufficiently far so that the end can be gripped. The tube is then dented or kinked with a vise, hammer or other means, the tube being rotated while doing this so that the dents are spaced around the entire circumference, providing a path for the wire in many different directions, similar to that shown in the illustration. The wire pulled through this tube will come out straight and true.—H. L. Lackman, Philadelphia, Pennsylvania.

Crowning Pulleys in a Turret Lathe

I have found the illustrated set-up handy for crowning pulleys in a turret lathe. A cross slide, tool post and turning tool, taken from a regular metal-turning lathe, are mounted on the cross slide of the turret lathe and blocked up to the right height. When the pulley is ready to be crowned, the tool is set centrally with the rim, and the crank on the cross-slide screw is set with the handle upward where it is held with an iron rod hooked over the sleeve of the capstan shaft as indicated. With the crank in this position, movement of the carriage to the right causes the cutting tool to taper the surface of the work gradually as it cuts toward the right side of the pulley. To crown the other half of the pulley, the tool is brought back to the center of the rim and set with the crank handle down.—Avery E. Granville, Knox, Indiana.



Set-Up in Turret Lathe Utilizing Part of Regular Lathe to Crown Pulleys

¶Good tool handles can be made from hickory pitmans of old mowing machines.

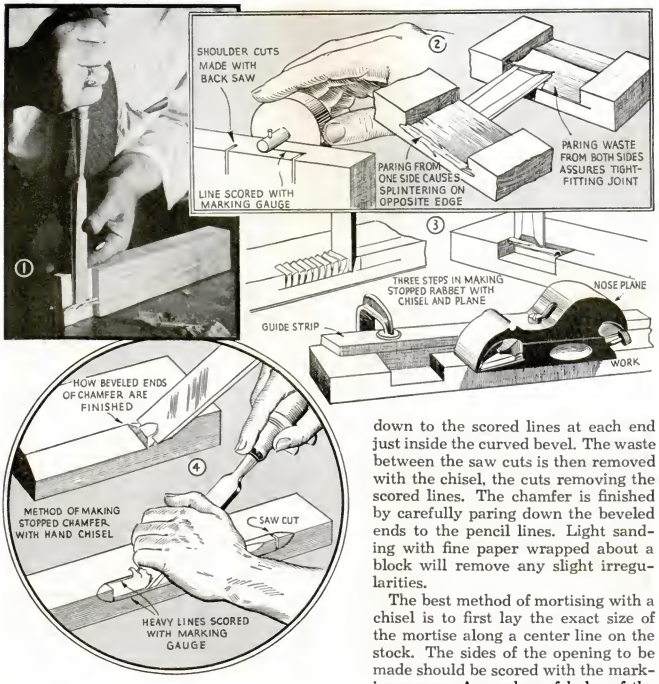
The Tricks of Using WOOD CHISELS · · ·

By W. CLYDE LAMMEY

CORRECT handling of wood chisels is of second importance to careful grinding and honing of the cutting edge. The skilled workman seldom uses a mallet when doing close work with a hand chisel. Instead, the pressure is applied with both hands, the cutting edge so guided that it takes off a light shaving at an angle to the grain. If slightly more pressure is necessary to force the edge through a knot or other obstruction, the handle of the tool is struck lightly with the palm of the right hand while the left hand guides the edge. With this method it is possible to work a hand chisel in very close limits without danger of splintering or otherwise damaging the work. The mallet is used only where it is necessary to remove a considerable amount of waste and accuracy is not so essential. The old-style chisel with a square-edged blade still is preferred by many skilled workmen, but a later type with a bevel-edged blade is now more commonly used.

Figs. 1 and 2 show steps in making a close-fitting halved joint. First the shoulders are cut down in a miter box. Then the depth limit of the waste is marked on the edges of the stock by scoring with a marking gauge. The waste is removed with a series of paring cuts, the cuts alternating from both sides of the piece and slanting upward at the center until the maximum depth is reached at the edges, after which the center is pared down to the same level. If you attempt to remove the entire block of waste in one or two cuts, the waste is apt to splinter out at the edge opposite the chisel, thus spoiling the joint. The limits of a recessed joint or mortise should always be scored first with the marking gauge, as the scoring aids in breaking the chip at the proper point and also gives a true line for starting the chisel.

A quick method of making an accurate stopped rabbet is shown in Fig. 3. The waste at the ends is removed first with a chisel, the length of the openings being sufficient to allow the cutter of a nose plane to clear. A hardwood strip is then

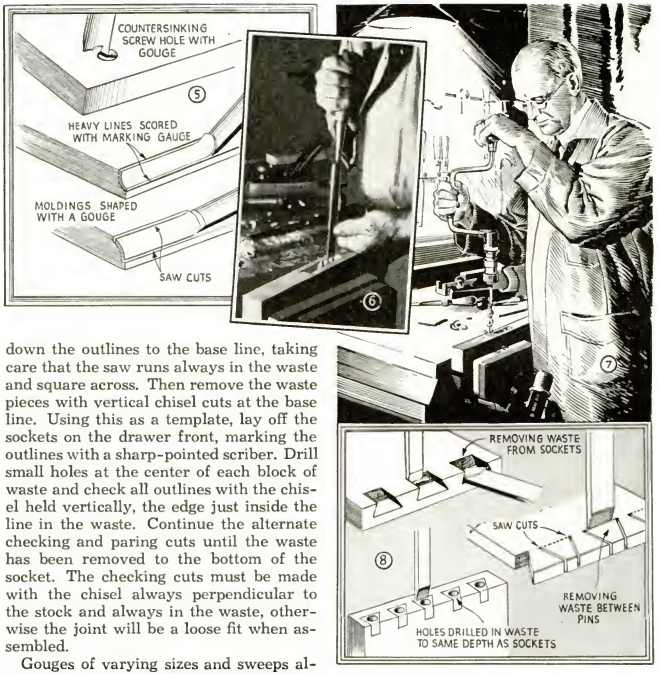


clamped to the stock as a guide for the plane, which is used to remove the balance of the waste. A stopped groove can be made in essentially the same way by first chiseling the groove to depth and width at one end and using a plow or grooving plane to clear out the remainder of the waste.

Another operation which can be done only with the chisel is the stopped chamfer. The procedure is shown in Fig. 4. First the chamfer is laid out to exact size and length with pencil marks on the edge of the stock. These lines are scored deeply with the marking gauge just inside the pencil line so that the scored line will be removed with the waste. Saw cuts are run down to the scored lines at each end just inside the curved bevel. The waste between the saw cuts is then removed with the chisel, the cuts removing the scored lines. The chamfer is finished by carefully paring down the beveled ends to the pencil lines. Light sanding with fine paper wrapped about a block will remove any slight irregularities.

The best method of mortising with a chisel is to first lay the exact size of the mortise along a center line on the stock. The sides of the opening to be made should be scored with the marking gauge. A number of holes of the same diameter as the width of the mortise are then drilled close together and to a uniform depth along the center line as in Fig. 7. The ends of the opening are then cut down with a chisel of the same width as the mortise, as in Fig. 6. A wide chisel is used to pare the waste from the sides, using the line scored in the wood as a guide in starting the chisel.

Essential steps in making a corner dovetail joint are shown in Fig. 8. The usual practice in making dovetailed drawer joints is to lay out and cut the pins first. From these the sockets are laid out and cut in the drawer front. After you have the pins laid out to the proper size in accordance with the width of the stock, saw



down the outlines to the base line, taking care that the saw runs always in the waste and square across. Then remove the waste pieces with vertical chisel cuts at the base line. Using this as a template, lay off the sockets on the drawer front, marking the outlines with a sharp-pointed scriber. Drill small holes at the center of each block of waste and check all outlines with the chisel held vertically, the edge just inside the line in the waste. Continue the alternate checking and paring cuts until the waste has been removed to the bottom of the socket. The checking cuts must be made with the chisel always perpendicular to the stock and always in the waste, otherwise the joint will be a loose fit when assembled.

Gouges of varying sizes and sweeps always are useful in the small workshop. Simple molding shapes can be made quite easily with this tool, Fig. 5, if no shaper or power saw is available. By checking the width with scored lines and using a gouge of the proper sweep, it is easy to do fluting on flat surfaces. With nothing else at hand you can use the gouge to countersink screw heads in the manner shown in Fig. 5. The gouge is also much used in making model-boat hulls where it is necessary to pare down either convex or concave surfaces. The tool is handy for outlining carvings and in irregular recessing. Using a gouge of the proper sweep, you can make the vertical outline cuts for a circular recess or any curved recessed design when inlaying with plastics.

Spring Caps for Ink Bottles

To keep his inks tightly covered, and yet instantly accessible, one show-card writer provided spring caps, as shown in the drawing. A length of spring wire was inserted through each cork and bent as indicated, and then fastened on the wall above the bench. The springs held the corks securely against the mouths of the bottles to prevent evaporation.

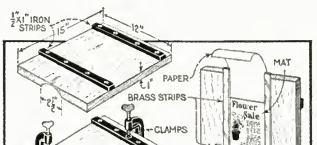
Skid Chains Nailed to Gangplank Provide Footing for Workmen Pushing Wheelbarrows

Old Skid Chains Prevent Slipping on Gangplank

When rain, snow and mud on gangplanks become sources of danger to the workmen, old auto skid chains are used by one contractor to prevent accidents caused by slipping. The chains are merely nailed onto the upper surfaces of the planks and do not interfere with the ease of pushing a wheelbarrow over them.

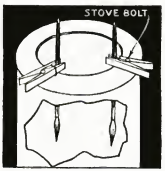
Homemade Form for Casting Stereotype Metal

Owners of small printing shops will find this outfit handy for casting small jobs of stereotype metal. Two surfaced wood blocks that are dry and free of knots and rosin are used. Iron strips screwed to one side of each block reinforce them and provide a footing for clamping them together. A small bevel in one end of each block facilitates pouring the hot metal. In use, the mat from which the cut is to be cast, is placed between brass strips as shown, after which paper is used to fill out the form and prevent the metal from running under the upper edges of the strips. After clamping the blocks together, the form is heated and the metal poured.



Occasional Jobs of Stereotype Casting Are Done Easily with This Form

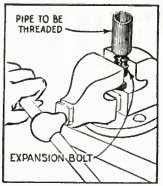
Artists' Brushes Held in Cleaning Solution with Clothespins



Artists, sign painters and show-card writers will find that spring-type clothespins provide good clamps for holding brushes in a can of cleaning solution. Get a can that has a wide rim around the top edge, and fasten the clothespins to the rim with stove bolts which are run through the springs of the pins and through holes drilled in the rim.

Expansion Bolt Holds Pipe Nipples While Threading Them

Held in a vise, an expansion bolt served nicely to hold short pipe nipples while threading them. Each nipple was slipped over the jaws of the bolt, which were then tightened to hold it after which the bolt was clamped in a vise as shown. It was a matter of a few seconds to loosen the bolt and change the nipple to thread the other end. —A. H. Waychoff, Tempe, Ariz.



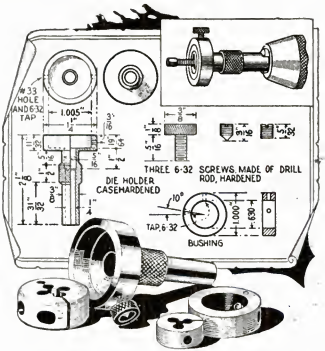
◐Mixing powdered boracic acid, 5 grains, with each ounce of shellac to be used as an undercoat on wood causes the shellac to dry very hard so that it serves as a filler as well as an undercoat.

Mash Mixture for Poultry Flocks

Many poultrymen are using the following mash mixture with good results: Yellow corn meal, 360 lbs., shorts or ground wheat, 200 lbs., bran, 100 lbs., pulverized oats, 100 lbs., alfalfa meal, 80 lbs., meat meal (60% protein), 100 lbs., dried buttermilk, 50 lbs., and salt, 10 lbs. If skim milk is available, the dried buttermilk can be eliminated and the meat meal reduced to 50 lbs. In this case, 460 lbs. of corn meal should be used in the mixture. Feed only mash for the first three or four weeks and then cracked yellow corn and whole wheat. From the fourth to tenth week feed corn and wheat, 1 part, to mash, 2 parts.

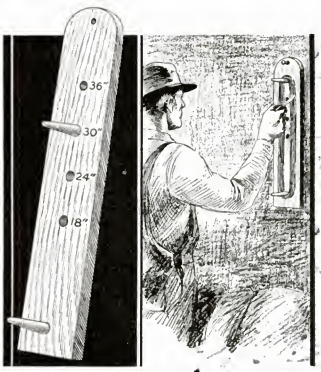
Die Holder for Threading Work in a Lathe

With this die holder, it is a simple matter to thread stock in a lathe. The holder is made from one piece of cold-rolled steel and is casehardened. The shank end is turned to the largest diameter that can be held in the tailstock chuck and the other end is turned to take a large die as shown,



Threading Work in a Lathe Is Done Easily with This Die Holder

after which one side is drilled and tapped for a knurled set screw to hold the dies. The holder is drilled transversely so that the threaded end of the work can project into it. Bushings of various sizes are used to adapt the holder to smaller dies.



With This Adjustable Gauge Block, Quantities of Tie Strings Can Be Cut in a Few Seconds

Adjustable Gauge Block for Cutting Tie Strings

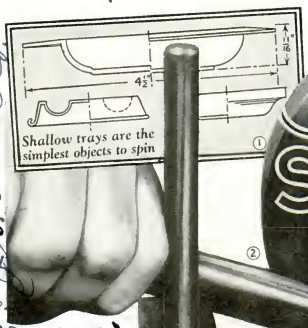
In mills or warehouses where quantities of tie strings are used, this adjustable gauge block will be found a time saver for measuring various lengths of strings needed. Two tapered wood pegs, one of which is adjustable, are set in holes in a board and the assembly hung on a wall. It is then a matter of a few seconds to set the adjustable peg, loop the string over the pegs and cut it into tie strings.

Turning Uniform Loops on Wires for Electrical Connections

Electrical work often requires that uniform loops be formed on the ends of a number of wires to make connections to terminals. This can be done very easily if three or four equally spaced marks are filed on the outside surface of one jaw of a pair of taper-nose pliers. This will enable you to form as many loops of the same size as needed.—C. E. Packer, Chicago.

Metal Spinning

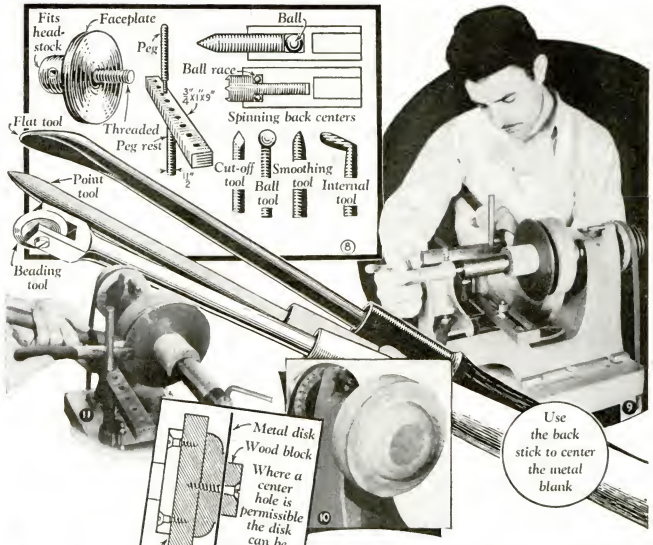
by R. GREGG

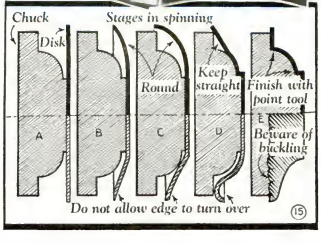


BEGINNERS in metal spinning should start with simple projects, such as the shallow trays shown in Fig. 1. These can be fashioned from pewter or soft aluminum on the woodworking lathe and a few accessories. The first step in the procedure is shown in Fig. 3—a wood chuck is turned to the exact shape of the tray, and glazed with laundry soap or beeswax. A piece of pewter or aluminum of the required size is nailed over the chuck as shown in Fig. 4. The face of the metal is lubricated with cup grease, Fig. 5. The spinning tool, in this case, is a hardwood stick, rounded at the working end. With the tool rest set at an angle of about 45°, and the lathe running about 800 r.p.m., the rounded stick is applied to the metal, pressure being exerted to expand the metal into the chuck. The stick should not be held in one place, but should be worked constantly from the center of the disk to the rim, and then back again, keeping the point of contact a little below the lathe center, as shown in Fig. 6. The metal will work quite readily into the depression, and the sharp corners of the tray can be worked in with either a pointed metal tool or a smaller stick. Any metal-cutting tool

Shallow trays should be the first projects. Deep objects should not be attempted until you know how the metal reacts

After polishing, cut the tray free with any sharp metal-cutting tool





can be used to trim the edge, as shown in Fig. 7.

While the method of metal spinning just described is quite simple and suited for turning of shallow trays, it is not the standardized manner of working. In most spinning projects, the metal is spun around and not into the chuck; also, there is a considerable deviation in the way of tools and accessories. Taking the same project, the chuck would shape up as in Fig. 10. This can be fastened to the regular lathe faceplate; also, the metal disk, itself, can be screwed to the chuck if a hole through the center of the metal is permissible, as shown in Fig. 12. Most spinning work, however, demands a special faceplate, with a threaded projection to take the chuck, as shown in Fig. 8. This diagram also shows the peg tool rest and the spinning back center. As to tools, you can get along nicely with four different types; a "flat tool" for breaking down the metal, a "point tool" for working sharp corners, a "beading tool" for making beaded or rolled

METALS USED IN SPINNING

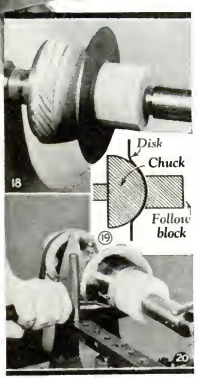
METAL	WORKING SPEED	REMARKS
No. 1 OR No. 2 PEWTER	600- 800 R.P.M.	WORKS EASILY—NO ANNEALING
ALUMINUM	800-1000 R.P.M.	USE ONLY SOFT VARIETIES—NO ANNEALING
COPPER	800-1000 R.P.M.	MUST BE ANNEALED THROUGHOUT SPINNING
BRASS	800-1000 R.P.M.	REQUIRES ANNEALING
ZINC	1000-1200 R.P.M.	SOFTEN SAME AS COPPER BEFORE WORKING

USE CUP GREASE OR YELLOW LAUNDRY SOAP AS LUBRICANT

17

edges, and a "cut-off tool" for trimming the work to size. A final accessory is the "back stick." This is simply a 15-in. length of $\frac{5}{8}$-in. dowel rod, pointed on one end like a blunt chisel.

With these accessories on hand, you can proceed with the shaping of the ash tray. First, mount the wood blank on the faceplate, and turn it to the proper chuck shape. Now, center a smaller block of wood directly behind the chuck, and bring the tailstock center into place. This second block is the "follower" or "follow block." Its purpose is to hold the metal blank in place. Prepare this block by turning it down to a diameter $\frac{1}{8}$ to $\frac{1}{4}$ in. less than the bottom of the chuck against which it will seat. You are now ready to spin. Insert the metal blank between the chuck and the follow block, centering as closely as possible. Start the lathe. Take the back stick, and, holding it against the fulcrum pin on the tool rest, push it in to touch the edge of the revolving metal disk as in Fig. 2. At the same time, loosen the tailstock slightly, as shown in Fig. 9, and



18 19 20

the blank will center itself perfectly. It must, of course, be a perfect circle to start with, with no jagged or projecting edges. After lubricating the blank on both sides, take the flat tool and place it against the left side of the fulcrum pin, which has been placed in the first hole to the right of the metal blank. Exert pressure with the round side of the flat tool, supporting the metal on the opposite side with the back stick, as shown in Fig. 11. Work from the center of the disk to the edge. The metal will form into a saucer-like shape quickly, and from this shape through the successive stages shown in Fig. 15. Fig. 13 shows the metal almost down to the surface of the chuck while Fig. 14 shows the point tool being used to work the metal into the sharp corners. Do not allow the outer edge to turn over, but keep it rounded or straight. Keep the tool rest 3 or 4 in. away from the rim of the metal blank and change the position of the pin as often as necessary to secure the proper working angle. Do not stay in one place too long, but use sweeping strokes over a large area. Keep the metal lubricated. Contact the tool with the metal somewhat below the lathe center.

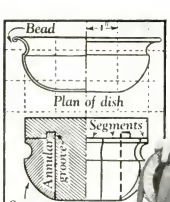
Your first project will show one or both of two common faults: The surface of the metal will show many concentric rings where the tool has cut into the metal and the metal will buckle or ripple at the rim. To correct the first fault, use the round side of the flat tool as much as possible, and let your strokes be uniform. The second fault can be corrected by keeping the metal blank either dish or funnel-shaped without allowing the edge to turn over to

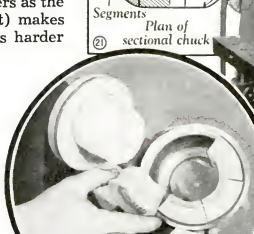
form a bell shape. Work from the center out. Do not form the metal to the exact shape at the rim until you have worked the center portion into place.

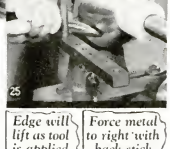
A word about the proper metals for spinning: Pewter is ideal; either No. 1 (plate pewter) or No. 2 (triple pewter). Do not use ley pewter (No. 3 pewter) for food or beverage containers as the lead content (20 per cent) makes it unsafe. Aluminum is harder than pewter, but yet works nicely and takes a fine polish. It requires no annealing, and, from "dead soft" it will turn up just the right degree of hardness during the course of the average spinning. Do not attempt to work hard aluminum. If necessary to anneal, heat to about 650° and allow to cool. Copper spins nicely, but will harden during the course of the spinning and must be annealed two or three times by bringing it to a cherry red heat. Working speeds for spinning different metals, and their characteristics are given in Fig. 16.

Figs. 17 to 20 inclusive show how a spherical or pointed object is spun. The follow block cannot hold the metal blank in place during the initial shaping. Instead, use a "starting chuck," which is turned to the shape of the bottom of the object or end of the sphere, and it also has a rim to snugly take the metal blank, as shown in Fig. 17. The actual spinning proceeds as before, switching to the finishing chuck and the special follow block to complete the work. Care must be exercised in smoothing over the original break left by the starting chuck.

"Sectional chucks" are the most fascinating to work with, and are necessary when the neck or opening of the spun object is less in diameter than some other part, which is the case with the dish shown in Fig. 21. A starting chuck is first used. This is made like any one-piece chuck, and carries the shape of the dish to the widest diameter. In the foreground, Fig. 22, you can see the dish as shaped over the starting chuck. The sectional chuck consists of a core, around which a







number of wedge-shaped sections and one "key" section with straight sides are grouped. These segments, tied together with string, are slipped over the core; then, the partly spun dish is placed over the whole chuck and the string is removed. After spinning the rounded bottom, Fig. 25, the point tool can be used to spin the constricted neck, as in Fig. 24, while the beaded edge is formed in the manner shown in Figs. 26 and 27. The dish is then slipped off the core, allowing the key section and the other segments of the chuck to be removed from the inside of the dish, as in Fig. 23.

Metal-Cutting Shears on Ladder for Sheet-Metal Workers

Sheet Metal Cut as Needed on Roof with Shears Screwed to Side of Ladder

Sheet-metal workers will find that a cutting shears screwed to one side of a ladder near the top saves time when working on roofs and eaves. With this arrangement it is unnecessary to leave the ladder to cut the various pieces of metal needed for the job. The shears consist of a length of angle iron or steel and a piece of flat iron, pivoted together as shown.

Rosin Keeps V-Belts from Slipping

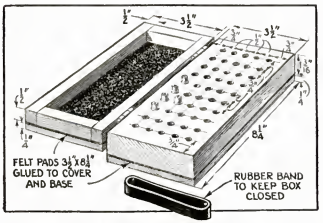
Slipping V-belts can often be remedied easily, especially in cases where the load is slightly too great by liberally coating them with finely powdered rosin. The surface of the belt should be softened slightly before applying the rosin. If the belt is leather this is best done by coating it with castor oil, but in the case of rubber or canvas belts, a thin coating of graphite should be used.

Tool Removes Old Putty from Window

To remove old putty from a window for putting in a new glass, a glazier notched one edge of his putty knife to leave a sharp point as indicated in the detail. With the knife fixed this way, most of the putty is removed at one sweep of the hand.—A. H. Waychoff, Tempe, Ariz.

Safety Box for Blasting Caps

In an effort to avoid injury caused by blasting caps accidentally exploding in workers' pockets, the U. S. department of agriculture has designed a safety box to carry them. It consists of a small hardwood block and a hinged cover, the former having several ¼-in. holes drilled through it to hold the caps. Layers of felt glued inside of the cover and over the holes on the bottom of the block help to cushion the caps. The bottom is a thin piece of

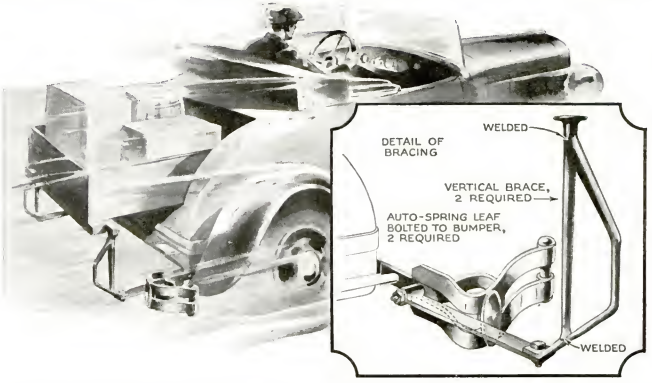


Cushioned Box Made from Hardwood Block for Carrying Blasting Caps in the Pocket

wood screwed to the underside of the block over the felt.

A discarded piston ring that has been broken in half and the ends wrapped with tape makes a good bearing scraper.

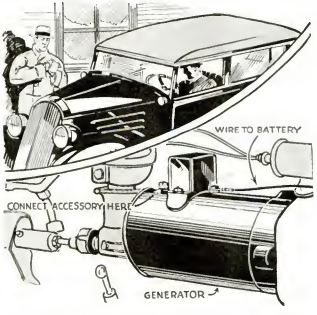
Removable Box for Light Hauling in Coupe

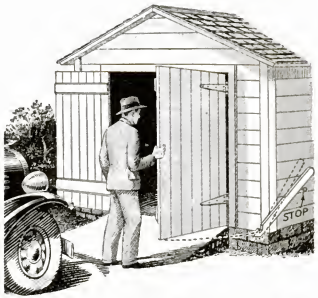


On coupes having no spare tire in the rear and equipped with bumperettes, a box for light hauling can be quickly installed in the rear compartment. Simply remove the cover and slide the box in place. Two vertical braces, bent and welded as indicated, and bolted to sections of old auto spring, support the rear end of the box, which projects about 2 ft. beyond the car body. The rear bolt of each bumper is removed and a longer one substituted to reach through the eye of the spring leaf. With the leaf resting on the lower member of the bumper, this arrangement is sufficiently strong. To remove the box, take out the two bumper bolts.

Car Accessories Connected to Prevent Discharging Battery

Car batteries are often discharged by inadvertently leaving some accessory such as a defroster, fan or heater motor turned on after parking the car. This trouble can be avoided by connecting one wire of the accessory to the ground of the car, which is the motor or chassis frame, and then running the other wire to the electrical cut-out which is connected to the generator. There are two terminals on the cut-out and if you are in doubt which one connects to the generator, hook the accessory wire to each one in turn while the motor is stopped. The terminal that does not supply current to run the accessory is the one to which the wire should be permanently connected. In this way, the accessory will function only when the motor is running and there will be no current consumption from the battery at any time as all the current comes directly from the generator terminal.—C. E. Packer, Chicago.





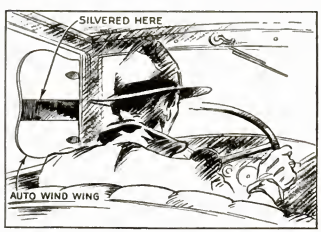
Notched Hardwood Strips Pivoted to Corners of Garage Hold Hinged Doors Open

Foot-Operated Checks Hold Garage Doors Open

Simple checks for holding garage doors open can be made as indicated. Each one consists of a hardwood strip notched near one end and pivoted to the corner of the garage as shown. A stop pin projecting from the side of the building holds the check in position so that the door, when opened, engages the notch. To release, press the projecting end with your foot.

Rear-View Mirror on Auto Wind Wing

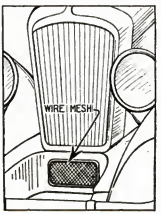
Desiring a rear-view mirror on the side of my car, and, at the same time retain full use of my wind wings, I had a strip 4 in. wide silvered across the center of the



Silvering Center of Wind Wing Provides Adjustable Rear-View Mirror on Side of Car

wing. This does not interfere with one's vision and is easily adjusted to suit the driver. Two thin coats of waterproof varnish should be applied over the silvered portion to protect against rain or other moisture.—Eddy L. Brown, Los Angeles, California.

Grille in Splash Apron Helps Cool Cylinder Oil



When a car is driven at sustained high speed, the oil often gets hot and thins out rapidly. On many new cars, this trouble is eliminated by providing an oil cooler. However, on the older cars, the temperature of the oil may be kept down considerably by cutting an opening in the splash apron under the radiator to provide better circulation of air around the oil pan. The opening should be covered with a grille made of heavy wire mesh.—D. Cliff, Boston, Mass.

Flushing Steering-Gear Housing with Hot Oil

It is a good idea to thoroughly flush out old grease in the steering-gear housing on a car periodically, but this is a difficult job on many cars as there is no drain plug. However, if a quart of hot cylinder oil is slowly pumped into the housing and allowed to run out of the filler plug, most of the grease will be dissolved and will then pass out with the oil.

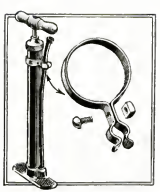
Tight Hose Connections for Auto Water Systems

When renewing auto-hose connections, you can make a tight-fitting job that will not leak by getting a size of hose that is just a trifle too small to be forced over the nipples of the tank and block. The ends of the hose are soaked in gasoline for

an hour, which will cause them to swell enough to be slipped in place. As soon as the gasoline evaporates, the hose will shrink and grip the nipples so securely that hose clamps are hardly needed. However, it is advisable to use clamps as the hose will have a tendency to stretch when it gets old and the rubber loses its elasticity. Hose having wire or extra heavy fabric reinforcement, will, of course, not respond to this treatment.

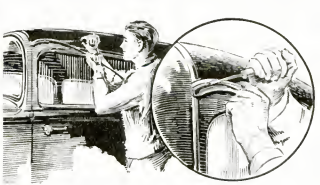
Clamp Holds Free End of Pump Hose

To keep the air hose on his tire pump from becoming entangled with tools in his kit, one car owner fastened the free end of the hose to the pump with a clamp. This was made from a strip of spring steel as shown, and was attached with a stove bolt to the pump cylinder.



Removing Gutter Tape from Car Top

When renewing the covering on car tops, especially those on which the covering extends down over the edge of the top, the gutter and metal tape along the edge can be used again if they are removed undamaged. To do this, insert a dull screwdriver blade under the tape at one end and pry it out. Then shove the tool point along between the gutter and the upper edge of the tape, after which the gutter is pried off. To replace the tape, reverse the procedure, pulling the screwdriver backward as shown.



Screwdriver Used to Remove Gutter and Metal Tape from Car Top before Renewing It

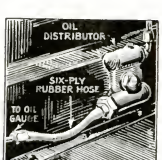
One-Wheel Truck for Carrying Storage Batteries

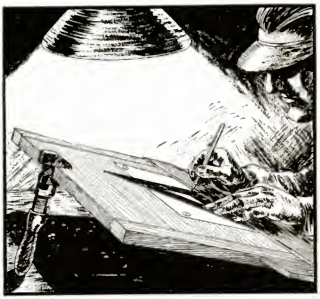
Simple Truck Improvised from Pipe and Fittings for Carrying Storage Batteries in Garage

Because his regular battery truck was frequently borrowed by other mechanics in the shop and seldom at hand when needed, a battery repairman in a large garage made a truck especially for his own use by assembling a 4-ft. length of 1-in. pipe, a tee and a large caster as shown. The caster was held in a hardwood plug driven into the tee, while two iron hooks fastened to the pipe carried the battery.

Rubber Hose Stops Knock in Oil-Gauge Pipe

Sometimes a car will get an annoying knock in the pipe leading to the oil gauge caused by back pressure on the oil pump. To eliminate this trouble remove a short section of the pipe near the pump or oil distributor and install a piece of six-ply rubber hose. The hose should have an inside diameter at least 1/16 in. larger than the outside diameter of the pipe.—J. L. Baker, Cooper, Tex.





Monkey Wrench Clamped to Edge of Drawing Board Supports It at Angle on Bench Top

Wrench Supports Drawing Board

When you use a drawing board on a bench or table top and wish to set it at a convenient working angle, but cannot find a suitable block or prop, a monkey wrench will often solve the problem. It is clamped to the upper edge of the board, at the center, as shown, so that it projects vertically. This method of supporting the board is better than the use of props as it does not permit the board to slip off. Also, by thus eliminating blocks, there will be plenty of space under the board which may be used to lay the finished work.

Stenciling Paint for All Materials

A good all around water paint that is suitable for stenciling labels and addresses on shipping packages is made by stirring soluble casein, 1 lb., into boiling water, 5 qts. A small amount of sosine red, nigrosine black or other water-soluble aniline dyes should be dissolved in the water before adding the casein to give the color desired.

The Next Issue

DRESSING UP YOUR HOME FOR CHRISTMAS

Five interesting pages that describe simple methods of getting striking, decorative effects in and about the home, which help to put over the yuletide spirit.

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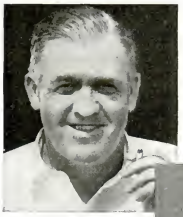
CRAWFORD BURTON... gentleman rider... twice winner of the Maryland Hunt Cup...dean of the strenuous sport of steeplechase riding... and a Camel smoker. Everyone is subject to strain. Hence the importance to people in every walk of life of what Mr. Burton says below about Camels.



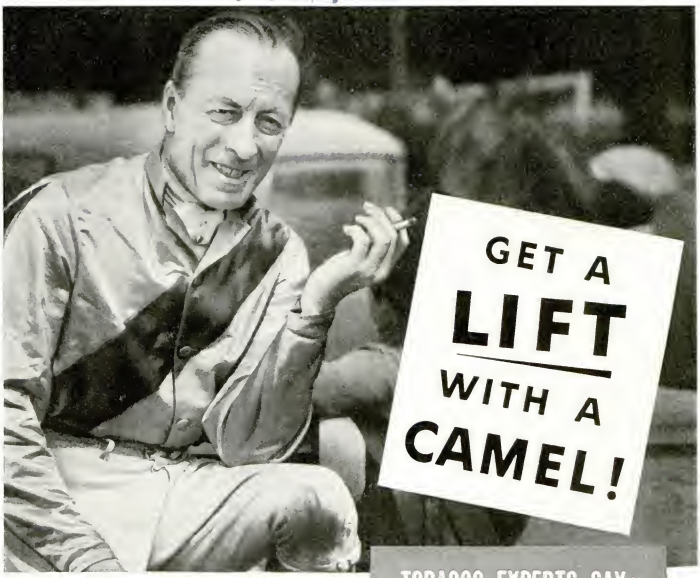
SPORTSMAN. Rex Beach, famous big game fisherman and writer, says: "When I've gotten a big fellow safely landed my next move is to light a Camel, and I feel as good as new."

AIR HOSTESS. Miss Marian McMichael (R.N.), of American Airlines: "When the run is over, my first move is to light a Camel. I find a Camel quickly relieves any feeling of tiredness."

Have you ever tried Camel's way of

Crawford Burton, the famous American steeplechase rider, is speaking: "When I'm tired from riding a hard race, I feel refreshed and restored just as soon as I get a chance to smoke a Camel. So I'm a pretty incessant smoker, not only because Camels give me a 'lift' in energy, but because they *taste so good!* And never yet have Camels upset my nerves." Note these important points: that Camels

CAMEL'S COSTLIER TOBACCOS



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All you need is a camera with a fast F/6.3 lens* (use wide open), some super speed film, and a few G-E MAZDA Photoflood lamps in your light sockets. Then you are ready to snap pictures of your family, friends, parties or workshop products . . . indoors AT NIGHT!

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FOR ACTION PICTURES

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GENERAL ELECTRIC MAZDA PHOTO LAMPS

FIGHTING FIRES IN YOUR HOME

(Continued from page 884)

a crack. If the air is cool to the hand it is still safe to arouse the other occupants and attempt to escape by the stairs; but if hot air rushes in and the pressure tries to blow the door back, slam it shut and don't open it again, even if there are others on the floor who should be aroused. A whiff of hot air and you will not be able to do anything for them or yourself.

Your window is seldom more than half open. Use a chair to smash the glass and make the opening as large as possible. The more air you have to breathe the longer you can survive. Then shout to arouse the neighbors or passers-by. Unless it is so short a distance that it is safe to do so, don't jump except as a last resort. Tie your sheets and blankets together to make a rope, fasten one end to the bed or some other heavy piece of furniture, and scramble down. Even if the rope doesn't reach all the way, or your strength gives out before you reach the ground, you will not have so far to fall.

If you try the stairs, crawl along the outer edge of the stairway. The smoke and heat will not be as bad there. If possible, wet a cloth and place it over your nose and mouth; it will enable you to breathe in air that might otherwise overcome you. If you enter another room, close the door behind you and take the same precautions when opening it that you did with your own. That you could safely breathe in the hall three minutes ago is no sign you can now.

The first thing to do when a big fire is discovered is to call the fire department. However, there are many times when a person, discovering the fire as it starts, can be his own fireman and possibly prevent several hundred dollars damage.

Defective electrical wiring or equipment often starts fires. How long is a short circuit? It is a short circuit as long as it is short, and the only way to eliminate it is to shut off the current. In most cases a fuse burns and the current is automatically stopped, but until it is the fire hazard is there. If you see smoke coming from any electrical source, pull the main switch and shut off the current. So know where the main switch is located. Once the current is shut off the fire may be fought the

(Continued to page 118A)

Here's how to take snapshots like this AT NIGHT!

IT'S EASY TO MAKE THIS PICTURE

Use Kodak "SS" Film. Set your camera for 1/25 second—open lens diaphragm to *f*.6.3. Put 1 Mazda Photoflood bulb in lamp A—2 in lamp B. Distances as indicated.

Sight the subject, click the shutter—and you've made the picture. Photoflood bulbs cost 25¢ each—last for many pictures.

...with Eastman's new high-speed "SS" Film

THINK HOW MUCH more thrilling picture making becomes! Now you can take snapshots indoors—*at night!*

All the "home life" scenes you could never get are at your finger tips—without special skill or elaborate equipment.

Use a camera with an *f*.6.3 (or faster) lens, loaded with Kodak Super Sensitive Panchromatic Film. This high-speed (extra sensitive) "SS" Film does the trick—it's three times as fast as ordinary film under artificial light.

For light, use two or three Mazda Photoflood bulbs. Just hold the camera in your hands as you would outdoors, set for 1/25 second, lens at *f*.6.3 opening, and click the shutter. You've made a snapshot. Indoors. At night.

For indoor pictures at night with slower lens cameras (including box models) use Verichrome (or "SS") and a Photo*flash* bulb—see free folder—with camera set for "time" exposures.

KODAFLECTOR—Inexpensive, efficient . . . makes 2 Photoflood bulbs do the work of 9. Complete, with stand, reflectors and cord, $5.

KODAK "SS"—the lightning-fast film, with the green lightning flashes on the familiar yellow box—the film that, indoors or out, in any light, improves picture quality.

KODAK SIX-20 with Kodak Anastigmat lens *f*.6.3 is ideal for night snapshots. Pictures 2¼ x 3¼ inches, price $17.50. Kodak Six-16, with *f*.6.3 lens, pictures 2¼ x 4¼ inches, $20.

IF IT ISN'T AN EASTMAN, IT ISN'T A KODAK

FREE FOLDER . . . complete instructions on indoor night photography. Photo*flood* snapshots . . . Photo*flash* pictures . . . all are covered in this free folder. At your Kodak dealer's—or write for your copy today. Eastman Kodak Company, Rochester, New York.

D 1129

THEY SHOOT 'EM ANYWAYS!

(Continued from page 859)

them safely back to the office. However, science has been busy in the newspaper cameraman's behalf, developing new types of cameras for special kinds of work. One is of the "candid camera" type, being small but with a powerful lens. With a camera of this type the photographer can take pictures without brilliant illumination or flashlights and the camera is so inconspicuous that the subject seldom knows he is being photographed. Still another news camera is equipped with a powerful telephoto lens. Such cameras are used at prize fights for, contrary to general opinion, the photographer does not sit in a ringside seat, but in a balcony eighty feet or more from the ring.

The very latest scientific achievement in newspaper cameras is the color camera. By its use, the newspaper is enabled to reprint news pictures in actual color. Due to its complicated operation and the length of time necessary to take a picture, the color camera at first could only be used for posed pictures. But the color picture camera has been so far developed that it has already taken such news pictures as naval planes in flight and courtroom scenes. The color camera is now actually in advance of the mechanical facilities of the newspaper. So far the complexities of printing are such that a color picture may be used only in a Sunday newspaper or a magazine but in the near future, newspapers probably will begin to use color pictures.

What are the chances of the young man to break into the ranks of the newspaper photographer? Very good, according to Mr. Sileo, who points out that newspapers are demanding more and more pictures to tell the story. While such outstanding dramatic pictures as the sinking of the "Vestris" in 1928 were snapped by an amateur it is rarely that a chance accident such as this occurs in which the amateur may prove his mettle. The best way for an outsider to break in, is to submit pictures as a correspondent from his home town, to attract the attention of the photo editor. These, if they possess sufficient news value, are used. Still another way is to start to work in the darkroom of a news photo bureau or newspaper. Some of the best newspaper photographers have gone up the ladder by this method.

D1033

FIGHTING FIRES IN YOUR HOME

(Continued from page 116A)

same as any other—with fire extinguisher, water, or by stamping it out.

If that pan of boiling grease on top of the stove starts blazing, don't throw water on it. Water will most likely cause the pan to overflow, spreading the flaming liquid to other parts of the kitchen, also the water will turn to steam and may scald you. When frying in deep fat, keep a lid handy —one larger than the pan. If the fat blazes up, clap the lid over the pan and the fire will die for want of air. If the flaming grease has spread to other parts of the room, throw on sand, salt or flour. If the roast in the oven catches fire, shut the door and let it burn itself out.

If you smell gas, don't strike a match to look for it. Spread soapsuds over the suspected pipe and watch for bubbles. All big fires start from little ones. So keep a good fire extinguisher handy, be sure it is in working order and know how to use it. And remember to direct the stream at the base of the blaze, not just in its general direction.

To avoid being trapped in that top floor bedroom, put in a skylight or an automatic vent above that open stair well. If you are handy with tools, you can make the vent yourself. All you need is a door in the roof, counterweighted so it will open outward. A fusible link, which melts at a temperature of 165 degrees, holds the door closed, but when the heat begins piling up the link melts, the door opens, and gives the fire a natural vent. The door will do nothing to extinguish the blaze, but it will make it possible to remain alive on that top floor long enough to escape.

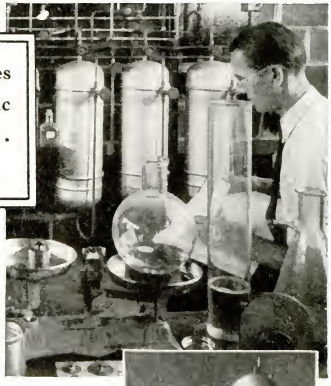
If your house has a flat roof and you prefer a skylight, don't make it of heavy wired glass that will not break. Before the air becomes too hot to breathe you want that skylight to break. Therefore make it of ordinary window glass, and put the protecting wire above or below it. A hail storm might break the glass, but a new pane is cheaper than a funeral.

[Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information will be furnished by our Bureau of Information upon request, accompanied by stamped envelope.

Socony-Vacuum Announces REVOLUTIONARY DISCOVERY IN OIL REFINING!

... that will save Millions of Dollars for Motorists this Winter

Socony-Vacuum Clearosol Process purges oil of impurities.. New Mobiloil Arctic starts easier . . lasts much longer . . protects engines in zero weather.



Here's miniature refinery where Socony-Vacuum worked on Clearosol Process. Big tanks like those below hold materials that wash away impurities.

THIS WEEK Mobiloil dealers are selling a new kind of Mobiloil Arctic, made in a new way called the Clearosol Process.

By actual test, this oil makes starting as much as 50% easier—lasts up to 25% longer — eliminates gum and sludge.

It flows quickly at low temperatures, yet holds its body under extreme ranges of heat.

Because it holds its body no matter how hot your engine may get, parts *keep* clean . . . rings never get stuck . . . valves don't gum up.

You may well ask, "How does all this happen?" The answer lies in a new approach to oil refining.

In the past, refiners tried to remove natural impurities from oil by acid baths and filters. Socony-Vacuum found a way to *wash away* these non-lubricating elements.

Our new process actually *dissolves* impurities—much as soap and water dissolve dirt! The oil that results is practically 100% pure. Such an oil is naturally worth more to you, but we haven't increased the price per quart by a single cent.

Now is the time to prepare your car for Winter driving. Drain off your Summer oil—and refill now with clean, fresh Mobiloil Arctic. Just go to the dealer who shows the Mobiloil sign with the red Gargoyle—or the familiar sign of the Flying Red Horse.

SOCONY-VACUUM OIL CO., INC.

Mobiloil Arctic

MADE BY THE NEW SOCONY-VACUUM CLEAROSOL PROCESS

SOCONY-VACUUM

Do you know how

- To fix furniture and household articles heretofore unfixable?
- To glue permanently . . . models, boats, and all woodcraft?
- To make and repair sports equipment (skis, fishing rods, toboggans, gliders, etc.)?
- To make your own waterproof crack-filler?

FREE BOOK

TELLS HOW

Send for YOURS . . today

Every handyman, home-craftsman and manual-training student should have this interesting and helpful Gluing Guide. It contains dozens of money-making and money-saving ideas on building, repairing and mending things easily and *permanently*. It tells how you can glue everything to stay glued . . . in spite of moisture, heat, rough usage or plain neglect.

YOU WILL ALSO RECEIVE

at no cost, a generous trial package of CASCO Waterproof GLUE . . . the same super-strength, wonder-working adhesive used in big woodworking and furniture factories. You will be amazed and intrigued to find that CASCO—a clean, non-odorous powder—mixes so quickly in cold water, forming a creamy, easy-spreading glue that makes all jobs *permanent, heat-proof* and *moisture-proof*.

The Big Secret of CASCO'S Great Strength

Unlike ordinary glues and pastes, which harden merely by evaporation, *CASCO sets chemically like concrete*. You only have to glue it once with CASCO.

Your Hardware Dealer carries CASCO in 10c, 25c, 40c and 65c cans. Also 5-lb. and 10-lb. sizes.

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(Save 2c—stick it on a penny post card)

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350 Madison Avenue, New York, N. Y.

Please send me my copy of the CASCO Gluing Guide together with your free trial sample.

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P.M. 12-34

Suggestions That Help in Gluing Work

An ordinary feather will be found helpful for applying glue in difficult places such as inside corners, dowel holes and small mortises. Another difficult gluing job is the application of ornaments, overlays and light moldings to flat surfaces, as the glue will often squeeze out into the corners next to the ornament. To avoid this, spread the glue on a flat board, which has been warmed slightly, press the ornament against it, and then lift it immediately and put it in place. You will find that just the right amount of glue will be picked up to make the ornament adhere. Since shrinkage of green lumber that has been plain sawed is slightly greater on the side farthest from the heart wood of the log from which it was sawed, glue should always be applied to the side nearest the heart wood as it also has a tendency to shrink the side of the board to which it is applied. In this way, it helps overcome the slight concavity the board assumed in curing. Glue contains moisture, and when applied to wood, it causes a certain amount of swelling, which is only temporary. For this reason, do not glue up cores and then surface them down to thickness immediately, or you will have sunken places at the joints. Let the cores dry first. If you have a solid desk door or similar item which has been partly split and you wish to repair it, take a soft-wood wedge and drive it in at the end of the break. The wedge will spread the crack so that glue can be applied with a feather.—John E. Hyler, Peoria, Ill.

Glue Prevents Knot in Rope End from Untying

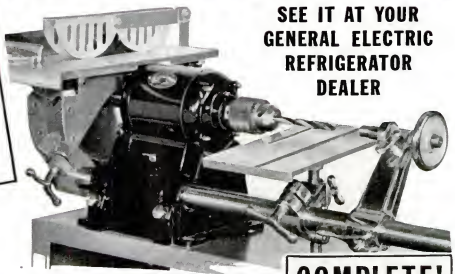
When knotting the end of a rope to prevent fraying, it is a good idea to dip the knot in glue and let it dry before using. This will help keep it from loosening. If the rope is to be exposed to the weather or used where it is likely to get wet, a good grade of waterproof glue should be used.—W. F. Schaphorst, Newark, N. J.

NEW GENERAL ELECTRIC COMPLETE WORKSHOP!

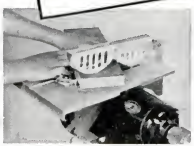
6 MACHINES IN 1

Circular saw • Jig-saw • Sabre saw for wood and metal • 9-inch Lathe and 2 wood-working tools • 8-inch Disc Sander and Sanding Table • Drill Chuck with set of 9 drills.

All are instantly interchangeable and adjustable. Just turn the attachment clamp and it's on or off. No bolts to loosen or tighten.



SEE IT AT YOUR GENERAL ELECTRIC REFRIGERATOR DEALER



CIRCULAR SAW

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See this Efficient, Sturdy, Direct-drive Quality Machine Demonstrated. Banishes All Belts and Pulleys. Complete with Motor, Bench, and Tools

NOW General Electric offers a complete wood and soft-metal working machine for home and shop use. Direct motor-drive eliminates belts and pulleys. Special clamping arrangement makes it possible to change from one attachment to another in a few seconds. Sturdy, reinforced steel cabinet gives the machine firm support—yet it is light enough to be moved at will.

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When you get this complete WORKSHOP—there's nothing else to buy. Motor, bench, drills, tools are all provided. G-E introduces this machine after years of research and development. Compact, high-efficiency ball-bearing motor has ¾" shaft reduced to ⅝" at the bearings. The powerful torque and inertia of the armature assure continuous flow of power at the cutting edge. Ideal for the home craftsman, professional woodworker, or small shop. When you see its completeness—realize that there is nothing else to buy—the astonishingly low price will truly amaze you.

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Motor, Bench and Tools 43 Parts In All

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FREE! Write for free book giving full description of G-E WORKSHOP. Address General Electric Company, Nela Park, Dept. PM-12, Cleveland, Ohio.

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CAMERA—takes clear, brilliant pictures. Uses 16mm. film, 50 ft. roll.
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We also have a complete list of film subjects for any projector. Write NOW for big, FREE Catalogue of Movie supplies.
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D1038

HIGH VOLTAGE BRINGS SUPER-POWER AGE

(Continued from page 890)

trical range in his Fifth Avenue mansion. Only a millionaire could afford the luxury of electric cooking in that day, but the mass production methods of electrified industry soon made it possible for almost anyone to enjoy an electrical dinner.

By 1920, when power-line voltages were up to 165,000, electricity was universally recognized as the ideal source of energy. In 1922, when radio broadcasting began, the voltage was up to 220,000 and power lines had a range of 250 miles. Today, Tesla himself foresees the day when industry will demand, and get, electric power through the same transmission as the radio voice.

The all-electric home is a reality.

Soon we will celebrate the completion of Boulder Dam, with a transmission line that transmits vast power to a distance of about 300 miles.

Where do we go from Boulder Dam? There is a cue to follow in the history of power development. In 1895, when transmission lines were carrying barely 10,000 volts, engineers were experimenting with 100,000 volts. In 1910, when the lines carried 110,000 volts, they were working on 220,000 volts. In 1922, when transmission was at 220,000 volts, engineers studied the possibilities of 1,000,000.

As Boulder Dam is hurried into operation with 287,000 volts, the research staff in General Electric and investigators of Massachusetts Institute of Technology are studying currents of 5,000,000 volts!

MYSTERIES OF EPIDEMICS ATTACKED BY SCIENCE

(Continued from page 827)

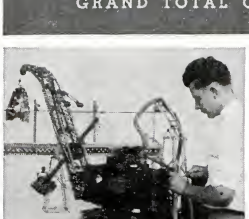
then decline and fall, later to rise again? Do weather or other conditions periodically render man easy prey for certain types of disease-producing organisms?

Infantile paralysis has been known, according to recent archæological discoveries, since at least 3700 B. C. Ever since recorded history, influenza has flared up violently every seventeen years. Usually it becomes a worldwide epidemic, like that which during the world war struck 30,000,000 people all over the globe.

(Continued to page 136A)

ERECTOR BOY ENGINEERS WIN BIG PRIZES!

★ NOW COMES A FINER ERECTOR · · AND A BIGGER PRIZE CONTEST · · FREE CHEVROLET GRAND TOTAL OF 1,001 PRIZES!



FIRST PRIZE WINNER LAST YEAR—Here is Eugene White, Jr. of West Fairview, Penna., with his marvelous model of an electric crane and shovel that captured first prize in the 1934 Erector Contest. Look! It's as big as he is. Eugene had his choice of a free trip to any place in the United States, but decided to use the money towards a college education.

YOU BUILD LIKE A REAL ENGINEER WHEN YOU BUILD WITH ERECTOR

In background, a traveling magnetic crane in a steel mill that will lift 7½ tons of metal at once.

Foreground, the traveling magnetic crane made with the New Erector No. 7½ set.

THE NEW ERECTOR SENSATIONAL No. 7 SET—Contains the powerful Gilbert 110-volt motor, all-purpose gear box, girders, gears and other real engineering parts for building over 150 action models. Erector Sets start at $1.00. Be sure to see the famous No. 4—the "Super-6" Erector—and the Sensational No. 7.

HELLO BOYS! Can you think of anything you can own that will give you so much thrilling fun as Erector? Just listen to this.

With Erector you can build a trench digger—with a real electric motor in it—and make it work just like the ones you see on the highways. You can construct motor trucks, fire engines, aeroplanes, locomotives. Put them together—piece by piece—with your own hands. You can build drawbridges that actually open and close—a towering ship crane such as used in Uncle Sam's Navy Yards—a mighty hoisting engine—and dozens of other thrilling engineering marvels . . . Then you can hook up the powerful Erector electric motor and make them hum with action. You are a full-fledged engineer when you have an Erector—because Erector is just like real engineering.

TUNE IN "THRILLS OF TOMORROW"—Follow "Spike" Butler in his hair-raising adventures. NBC—WEAF network, Fridays, 6:00 P. M. See your local newspaper for other NBC stations.

HERE'S YOUR CHANCE TO WIN A BRAND NEW CAR OR OTHER VALUABLE PRIZE!

How Eugene won his exciting prize is a real true story. Now you can do the same. This year I am having another Erector Contest—with *better* prizes than before. First prize is a Chevrolet auto. Then there are bicycles, cameras—a total of 1001 thrilling awards.

So right now, do these two things. First, mail the coupon below, and I'll see that you get my big illustrated "Look-'em-over" Book and an entry blank for the prize contest. Then go to the nearest toy store and pick out the Erector you want. Take your Dad along. He'll want to share in the fun . . . And good luck in my big prize contest.

Your friend, A. C. Gilbert

FREE—Clip the Coupon

Mr. A. C. Gilbert, The A. C. Gilbert Company,
421 Erector Square, New Haven, Conn.
Send me the big colored Erector "Look-'em-over" Book and entry blank for the Erector Prize Contest—both free.

Name .....

Address .....

City ..... State .....

D1083

C 20016

UNCLE SAM BACKS HOME BUILDING

(Continued from page 852)

simple. The prospective builder will be required to hold a fair equity in the land or own it outright. He will be able to borrow up to eighty per cent of the appraised value of the property, this value to include the land and the contemplated structure. The maximum that can be borrowed will be $16,000. The government will encourage long term loans, with installment payments running up to twenty years. With the monthly payments thus actually lower than rent, any family with a regular income will find it economically unsound not to own a home.

The inexperienced builder should consult an architect as the first step. The architect can not only convert your ideas into workable plans, but his services include specifying materials, obtaining estimates from contractors, and supervising the construction. The owner may deal with a general contractor, or with sub-contractors such as carpenters, painters, plumbers and electricians. In the latter case he must prepare a total estimate for submission to the lending agency. The owner may also buy the materials and hire the labor himself, or even do his own work; or he may turn over all details to the architect or general contractor.

With the Production Credit associations, organized under the farm credit act, already in operation, and with the housing survey conducted by the department of agriculture already completed, the farmer will be able to obtain more help in planning than will the city dweller, at least until the federal housing administration has a chance to catch up. Complete working drawings for forty-two types of rural houses are already prepared, and may be obtained at five cents a sheet. County commissioners and local lumber dealers have been furnished with catalogues of these plans, or may obtain them from their State Agricultural College. The farmer may thus select the type of dwelling he desires to build and obtain a full set of blueprints for about $1.50, while his city cousin must pay an architect for similar drawings. Blueprints for barns, silos, chicken houses, and other farm buildings may now be obtained through the same agencies at prices that barely cover the cost of printing.

THE MAKING OF A SLED DOG

(Continued from page 894)

government scientists have been working on the case for years. First the animals have a heavy discharge from eyes and nostrils. Then comes a complete loss of appetite. Then follows paralysis of the hind quarters. Then death. They die four to eight days after the first symptoms and ninety per cent of the cases are fatal.

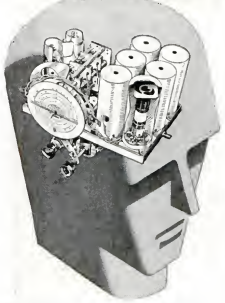
The dogs are trained from early life to take their place in the harness. Soon they learn to follow a leader, and pull in unison. When traveling over ice in the extreme cold weather they wear boots, else the contact with the ice would rip the flesh from their feet. In recent years husky dog derbies are being run at a variety of winter resorts, with three-day races customary in the eastern resorts and two-hundred-mile events the rule at the northern frontier towns. The course for three-day races is usually forty miles a day. The dogs usually make the forty-mile runs in better than four hours. At The Pas, northern Manitoba, and other frontier posts, the race is a straight long-distance endurance contest, with no breaks in the course.

In the three-day races the driver may not change any of his dogs, nor alter their positions once the first day's race is finished. The dogs are marked with black paint so a driver cannot substitute. If one of the dogs breaks a leg or becomes sick, the driver must get along as best he can with the remaining team. And it is not unusual after a hard race to find one or more of the dogs riding the sled at the finishing point. Scouts are posted along the route, and the slightest sign of cruelty to dogs disqualifies a racer. The course in the east is usually along fairly clear roads, but a heavy snowstorm may make traveling hard.

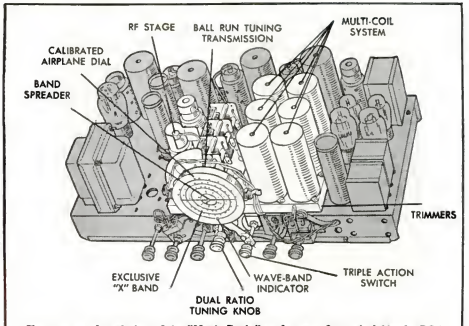
Drivers run behind their sleighs. When the team is going at good speed, the driver rides on the runners. Going up hill he always pushes to help the dogs. In snowdrifts he clears the way as much as possible, for time counts, and the dogs must not be too tired from this sort of work. Fish and meat are fed to these dogs. In the north more fish than meat is on the diet, for fish is a staple food, while meat is expensive. Racing dogs, liable to win purses running into thousands of dollars, are fed red meat in addition to fish, even in the northland.

Science develops a "Magic Brain"

that makes All-Wave Radio actually think!



RCA Victor engineers produce uncanny governing unit in all-wave chassis that is directing force for superior long- and short-wave performance



Here you see the relation of the "Magic Brain" to the rest of a typical 12-tube RCA Victor all-wave chassis. Indicated by the pointers are those parts of this unit which, acting in unison, produce the finest all-wave reception you've ever heard!

Here's the new and exclusive RCA Victor development that permits far greater latitude in all-wave performance. Human in its power of selection and direction of discovering signals, it can be compared to the human brain.

RCA Victor engineers have succeeded in designing the radio frequency *ahead of the first detector* so that it functions with equal efficiency on all bands. It amplifies the signal you tune *four times*, without acting on noise, cross-talk, image frequencies or other interfering factors. Thus, the wanted signal is *supercharged*, resulting in a four-to-one signal-to-noise ratio and a practical elimination of back-ground noise and cross-talk. Reproduction is clear, with a higher-fidelity tone.

The second great advantage is a separate and distinct set of three coils acting for each band. Each coil is trimmed or adjusted individually for maximum performance.

You get an enormously increased range in these new receivers—as much as 140 kc to 36,000 kc! Everything, practically, in the world of radio is yours. Also, in "Magic Brain" chassis of 8 tubes or better, an exclusive "X" band is provided—for hourly U. S. Government weather aviation reports. An interesting pamphlet on the "Magic Brain" is offered you, free. Use coupon below.

TABLE MODEL 128. "Magic Brain" Superheterodyne, domestic, foreign, police, amateur wave bands $69.95

"X" Band is on all sets of 8 tubes or more

RCA Victor Instruments priced from $18.75 to $375, equipped with RCA Micro-Sensitive Radio Tubes. All prices F.O.B. Camden, N. J., subject to change without notice. Any short-wave radio performs better with RCA World-Wide Antenna.

GET THE INTERESTING ANSWERS to these "Magic Brain" Questions!

What is the "Magic Brain"?
Why you get higher fidelity tone?
What are the 3 reasons for the RF stage?
How does the multi-coil system work?
Why is it so necessary?
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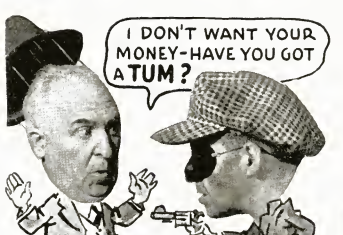

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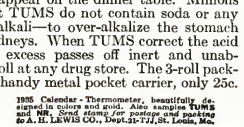

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MOVIE MAGIC IN THE MAKING

(Continued from Roto Section)

script. The plot may call for a lion to chase a monkey through the jungle. In real life the monkey might dodge out of the picture or the lion might kill it. The monkey is filmed as it runs across the set alone, the cameraman swinging his camera so the monkey stays near the right edge of the film. Then the lion is made to dash along the same path and this time the cameraman "leads" so that the lion is in the left half of the picture. By blending the right half of the first film with the left half of the second a realistic chase is obtained.

In a recent picture it was necessary for the hero to ride a hippopotamus onto a set and then stab it so the animal would stumble and die right in front of the camera. The problem was solved by using a tame hippopotamus and a knife fitted with a collapsing blade. The hippopotamus came charging toward the camera and as the actor raised his knife for the fatal blow the scene was cut. The rest of the picture was made in reverse, with the hippopotamus lying down and the actor holding the knife so that it was apparently plunged in to the hilt. At a signal the animal struggled to its feet and then the actor raised his knife. When this part of the film was run backward the actor appeared to kill the animal in lifelike fashion.

The exciting screen chases that furnish thrills to every one are rarely filmed the way they appear. In some cases, such as an alligator swimming after a dog that has fallen into the water, it may be that the alligator and the dog never saw each other and the suspense is manufactured by cleverly using alternate strips from two different films. First you see the dog struggling in the water, then a shot of an alligator as it comes to the surface and looks around, then back to the dog swimming, then back to the alligator, apparently swimming in pursuit.

(Concluded next month)

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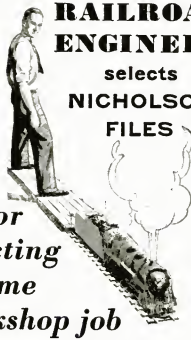

RAILROAD ENGINEER selects NICHOLSON FILES

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Mr. E. W. Leaver, twenty-nine years engineer on a leading Eastern railway system, spends his spare time building models of the locomotives he operates. The Pacific locomotive model, shown above, will have a steam pressure of 75 lbs. to the square inch, fire with coal, and pull an estimated weight of 275 lbs.

Mr. Leaver is shown using a Nicholson File to file the foundation ring for the boiler.

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DARE-DEVIL "WATER BUG" RIDERS

(Continued from page 821)

may eventually attain speeds in excess of eighty miles an hour, some drivers think. An innovation among Italian race drivers is a four-cycle six-cylinder supercharged outboard fitted to a metal hull. If you have an inventive turn of mind you can join the "haywire" class and race a creation of your own design. Nothing is barred and your boat may consist of two airplane pontoons with the engine in the middle, or a hull fitted with airfoils or hydrofoils.

Hull designers in America who have spent most of their time perfecting the bottoms of the hulls are now turning their attention to "teardrop" designs, streamlining the decks to increase speed. One speed boat enthusiast is streamlining his engine and mounting an air rudder on it, while others are experimenting with the "front drive" in which the outboard engine is mounted almost amidships just forward of the step.

The secrets of how to "hop up" a motor to deliver as much as seven or eight miles an hour more than its original speed are revealed by R. V. Collins, motor expert and record holder. First, all roughness in the motor casting in such places as the gas passages, exhaust ports, and transfer ports, must be filed away. Then the entire engine and shaft and propeller assembly are taken down and any high spots on the bearings are smoothed off. Finally, the pistons, connecting rods, and crankshaft are balanced on a static and dynamic balancing machine in a machine shop. Racing rules also allow slightly oversize pistons that fit tightly in the cylinders, but unless you are willing to chance burning up your engine they are not advised until you become an expert at controlling engine temperatures by regulating the carburetor mixture.

Next, you want a blended fuel composed of alcohol, benzol, and castor oil. Then, with half a dozen propellers of different size and pitch and several sets of spark plugs, your engine is ready to race. Whether your boat will be "hot" will depend a good deal on the particular propeller and spark plugs you decide to use. Winning drivers make their choice according to whether the water is fresh or salt, the altitude, the amount of chop on the water, and even the humidity.

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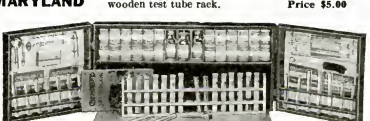

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BEGINNERS CAN BUILD THIS SHORT-WAVE PORTABLE RECEIVER

(Continued from page 903)

fitting cover plate. Regeneration is controlled with a 100,000-ohm variable resistor which is combined with the battery switch. Looking at the case from the front, the arrangement of the various tuning controls is exactly as shown in Fig. 2. The 2-plate antenna-trimming condenser is adjusted for best results, with each coil used, while the set is in operation. An open-circuit, midget-type phone jack is mounted under the tuning condenser. It is necessary to insulate the antenna-trimming condenser, and phone jack, from the metal case, but the tuning condenser and variable-resistor unit are mounted directly on the case. A complete material list may be obtained upon application without charge.

The audio transformer and r.f. choke are fastened to the bottom of the case with short flat-head machine screws. All fixed resistors, and fixed condensers, are provided with pig-tailed leads and are self-supporting. An 8-ohm wire-wound resistor is connected between the tube filaments which are in series. This resistor is soldered directly to the lug of a filament post on each tube socket; connecting wires are shown in Fig. 2, as the parts have been spread out to simplify the wiring diagram. An enlarged blueprint of the wiring and layout diagrams is available, those who wish it should specify blueprint No. 204. No. 18 hook-up wire with push-back insulation is used for all connections, which should be carefully soldered with a good grade of rosin-core solder. A hole is cut in the left side of the case, near the top, for the insulated terminal strip which is fastened to the case by means of two short machine screws. This antenna and ground-strip is clearly shown in the various photos. Note that the ground post is connected to a soldering lug placed under one of the mounting screws. In most cases an external ground gives the best results and this may be obtained with a flexible lead connected to a short, pointed brass rod thrust in damp ground, or an ice pick driven into a tree. All battery connections are clearly shown in Fig. 2. The A-battery will last a long time for intermittent use as the tubes only draw a total of 60 milliamperes.

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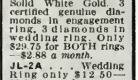

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HOW TO BUILD AN INEXPENSIVE SET TESTER

(Continued from page 904)

photo. The numbered pin jacks at the end of the tester are for the cabled pin-plug assembly and receiver tube-socket adapter shown in Fig. 5. The one illustrated is for a 4-prong tube and three others are required.

An 0 to 1 milliammeter is used with high-grade mutiplying resistors, to make the d.c. voltmeter. The scale was drawn on white cardboard, employing the old 0 to 1 scale as a pattern. The resistance scale was also calibrated on the 0 to 10-volt range of this same meter. All connections are shown in Fig. 3 and include the open-circuit resistance jack, and 9-volt C-battery used to supply the necessary voltage for the resistance tests. The resistance scale may be calibrated easily with external resistors of known values. The milliammeter is a popular-priced dual-range type. The a.c. voltmeter is converted to read fairly accurate for quick tests up to 1,000 volts, by means of a tapped 50,000-ohm voltage divider. The taps may be adjusted from any 1,000-volt a.c. source and the scale calibrated accordingly.

ALL-WAVE ANTENNA EASILY INSTALLED

(Continued from page 901)

the container, is spliced to any length of similar twisted-pair downlead that is necessary to reach the receiver. This downlead cable consists of a pair of twisted, rubber-covered stranded wires, and is available in any desired length. The spliced connections should be soldered and well taped. Suitable strain and stand-off insulators are provided to carefully insulate the entire system from the building. The set unit, shown in the insert photo, consists of a round, flat-metal casing provided with binding posts for the downlead; also pigtailed leads for the antenna and ground posts of the receiver. This unit couples the downlead to the set and is mounted inside the cabinet as shown in Fig. 5.

Fig. 3 shows a bent antenna arrangement where space does not permit the erection of a straight-line installation. When the roof space is not sufficient for a straight line or bent type, the double-V installation shown in Fig. 4 may be used.

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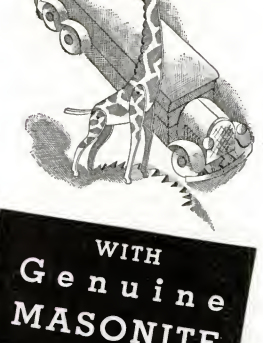

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STANLEY ROUTER-SHAPER

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Corner beading, dovetails, inlaying, dado, rabbett and molding cuts are typical of the finishing operations you can do expertly with this inexpensive home workshop outfit.

Thousands of present users are turning out work which compares favorably with the finest furniture factories. Send for catalog which describes the Router-Shaper and shows what it will do.

STANLEY
THE STANLEY ELECTRIC TOOL COMPANY
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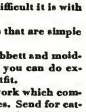

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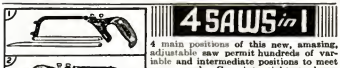

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Rapaport Bros.
703 W. Ohio St., Chicago

SHERLOCK HOLMES RETURNS

(Continued from page 811)

years, but furnished with the track of a suspected car the department of justice can identify the tires in five minutes. The identification of firearms is now an exact science. Given the bullet from the body of a victim, the expert can tell in a few minutes the make of both ammunition and gun. The same .45 caliber cartridges are used in the Colt automatic and the Thompson sub-machine gun, but in the pistol the rifling is to the right, while in the "Tommy Gun" it is to the left.

Handwriting is a most important factor in building up an actual picture of an unknown suspect. Experts are so well acquainted with the various schools of penmanship that a glance is enough to tell them not only where the writer received his education, but in what period.

Temperament is expressed in the manner of writing. A careless person will write illegibly. A neat letter indicates that the writer takes care of his personal appearance. Small writings and narrow margins show parsimony, while large writing, wide margins, and deep spaces between the lines show a disregard for expense.

The exact occupation of the writer cannot always be told with such certainty as it was in the Lindbergh case. Telegraphers join their words together for speed, persons connected with writing and publishing usually give themselves away by their rapid but still legible writing, together with the use of carets at insertions and the placing of circles around periods or replacing them with tiny crosses.

Attempts to disguise handwriting, incidentally, are invariably futile, for individual traits always creep in. Even block lettering is wasted, for in these days of applying for auto licenses, addressing packages, and other tasks requiring surety of legibility, most of us have had occasion to furnish samples of our lettering. The use of a typewriter is just as damning, for each make and model of machine has its own style of type, while each individual machine has imperfections which identify it surely.

¶Names and addresses of manufacturers of articles described in this magazine will be furnished by our Bureau of Information upon receipt of return postage.

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Please rush to me your new 1934 Catalog. I enclose ten cents in stamps to cover postage and handling.
My Name----------
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City----------State----------

MYSTERIES OF EPIDEMICS ATTACKED BY SCIENCE

(Continued from page 122A)

Tuberculosis seems to run in cycles of 200 years. Since 1850, the cycle has been on the downgrade. There have been four great epidemics of plague which spread to the four quarters of the globe. Most awful was that of the year of the "black death" which in the middle ages almost wiped out European civilization.

Mechanical brains are now aiding the study of these strange cycles of disease. In the chattering of tabulating machines, as hundreds of information-bearing cards are automatically sorted, doctors hope to find a clue. A mechanical brain showed that infantile paralysis most often attacks children who are brunette, have mongoloid eyes, deeply-colored skin, wide faces with widely separated eyes, and certain gland weaknesses. This information may be useful in selecting children who can be given special preventive attention in the future.

Two Johns Hopkins University research men applied mathematics to scores of case records. They learned that if you had several colds this year, you are likely to have a number of them next year. The third year, however, you probably would have fewer; while some people who had been immune would succumb more easily—suggesting that people pass through a cycle during which they are alternately more and less susceptible to colds.

While certain diseases burst out only at intervals, others continually smoulder but seldom become epidemic. Such diseases are limited to a class of people or to a single locality where they are constantly present. For example, cholera is endemic in India, yellow fever in Havana, plague in Tibet. The natives usually build up resistance to the disease. White men in the tropics catch fevers which seldom attack natives, while natives of the South Sea islands die like flies from measles.

Smouldering fires of disease may prove to be the means by which epidemics may die a natural death. In large cities, most people are exposed from time to time to most of the deadly diseases, but do not get enough germs at a time to become sick. Thus their systems build up a strong resistance which fortifies them against disease. In this way nature herself may eventually sound the death knell of epidemics.

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Winner PHOTO-SET

THEY HAVE NOT DIED IN VAIN

(Continued from page 843)

a few of the lifeboats were launched, and these were handled so clumsily that several capsized. The boats on the high side could not be launched at all, due to the heavy list. A freighter was within forty-five miles of the "Vestris" when the SOS was sent, but had no radio equipment since it carried a crew of less than fifty.

"The lesson that stands out most prominently in this disaster and the lesson that must first be learned," declared the investigators, "is that hereafter we must stress men more than things. In this modern age we are prone to direct our efforts as far as possible toward the invention of mechanical devices that will make things safer. As a result of it, I fear that we have become slaves of these things that we have invented to help us, forgetting that no matter how excellent a device may be, there must be competent men to handle it, and this competency in men must be stressed at sea more than any other place."

It also has been recommended that the salvage laws be revised. Under present conditions a captain hesitates to send an SOS, because it means that a ship coming to his assistance may collect as much as half the value of his ship and cargo. Feeling a responsibility to his employers, he naturally declines to call for help if he feels he has a chance to bring the ship into port himself. According to maritime custom, it is considered a disgrace for a captain to call for assistance, and it is rarely that a master who loses or abandons a ship can thenceforth find employment as an officer.

Last May the Nantucket shoals lightship was rammed by the "Olympic" and sank, seven of her crew being lost. The "Olympic" had been navigating through a dense fog by steaming directly toward the radio beacon on the "Nantucket," and failed to hear the fog siren soon enough to change her course. The lightship now on that station has been equipped with a short-range warning beacon that emits a distinctive warble note on the same frequency. When heard it will warn an approaching vessel that it is no longer safe to steer on the beacon. If this experiment proves successful it will be installed on all lightships.

(Continued to page 140A)

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THEY HAVE NOT DIED IN VAIN

(Continued from page 138A)

D1209

The disaster to the "Morro Castle" bears out the warning issued after the "Vestris" sank that "men rather than things must be stressed." This fire occurred within eight miles of shore and thirty miles of port, while the surrounding sea was dotted with ships within easy rescue distance, yet an apparently minor fire was permitted to become a conflagration before a call for help was given. Testimony has been given that no attempt whatever was made to close the fire doors, which act, experts say, would have confined the fire to the library where it originated.

Some automatic method of closing fire doors by a fusible link and weight arrangement is patently needed, and such equipment is now available; but the fact that the smoke detectors and automatic fire alarms both failed to register on the bridge, according to testimony, shows the futility of depending entirely upon automatic devices.

It is certain that a strong recommendation will be made that a more efficient method of training, licensing and disciplining crews be introduced. Several members of the "Morro Castle" crew have testified that they had never attended a fire drill and did not know where their stations were. Further recommendations are being made that salvage costs be cut so that captains will not be so inclined to delay calling for help; but the coast guard points out that its business is to come to the aid of shipping and that its services are free. A radio call will cause all coast guard vessels in the vicinity to proceed to the scene of the trouble and stand by to render assistance if needed. Two years ago there would normally have been sixteen coast guard vessels within two hours steaming distance of the "Morro Castle," with several only a few minutes away, but with decreased appropriations fourteen of the boats in this district are now lying idle. Nevertheless two cutters could have reached the "Morro Castle" within two hours if a call had been sent. These boats responded to the SOS, but it was then too late.

Only a guaranty of competent men to man ships in the future can assure us that the victims of recent tragedies have not died in vain.

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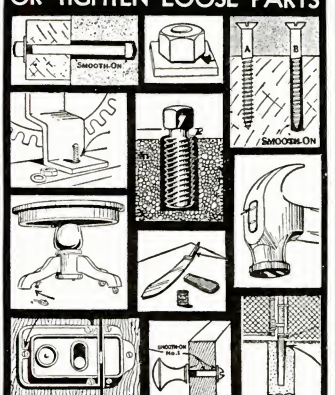

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HOW FAST CAN YOU STOP?

(Continued from page 813)

These have fewer parts than shoe-type brakes and are said to last the life of the vehicle without relining or adjustment. The brake, attached to the wheel like ordinary brakes, is now standard equipment on a number of truck fleets in the west and is being installed on police cars and airplanes. In a test a fully loaded oil-tank truck and trailer moving down grade at thirty-five miles an hour were stopped in sixty-two feet, about one-third the distance usually required.

The brake surface consists of two disks of brake lining that revolve with the wheel, pressure being applied equally all around the disks from two sides when the brake pedal is pressed. There is no end-thrust on bearings or axles and the brakes are self-cooling. The brake is not affected by water and is approximately twenty per cent lighter than other types. It is claimed that they permit better control of the vehicle, won't lock, and reduce tire wear due to the smoothness of application. Because of their sturdy construction they are also being used as clutches on marine engines.

Legislating safety into the automobile is being accomplished gradually by individual states. In states requiring drivers to undergo examinations, the accident rate was about thirty per cent lower in 1933 than in states without such laws. Of course, accidents increased generally from 1932 to 1933, but the rate of increase was only one-third as great in states requiring tests of drivers.

California, Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey and New York are among the states with driver's license laws.

Regular inspection of automobiles and equipment has been made compulsory in New York, Massachusetts, Delaware, Idaho, Maryland, New Hampshire, Nebraska, Pennsylvania and other states. Delaware operates its own "safety lane," moving the test equipment from town to town. Individual cities, Memphis, Tenn., and Evanston, Ill., have inspection laws and maintain "safety lanes."

Pennsylvania has joined the list of states which will make safety glass compulsory on all motor vehicles after January 1, 1935. New York, Michigan and Massachusetts have similar laws.

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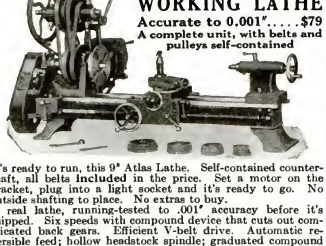

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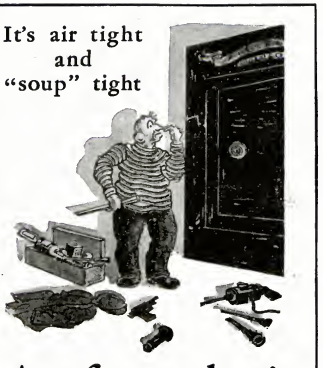

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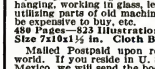

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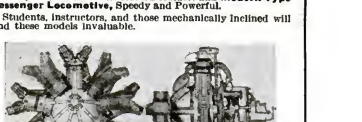

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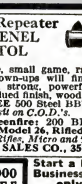

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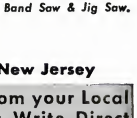

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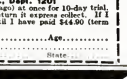

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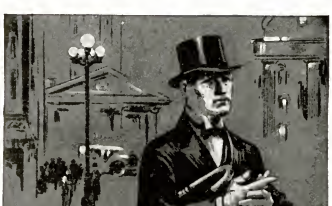

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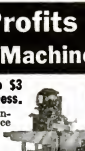

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State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared Willis S. Brown, who, having been duly sworn according to law, deposes and says that he is the business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the act of March 3, 1933, Postal Laws and Regulations, printed on the reverse of this form, to wit: First. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 200 East Ontario St., Chicago, Ill. Editor, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Managing Editor, L. E. Weber, 200 East Ontario St., Chicago, Ill. Business Manager, Willis S. Brown, 200 East Ontario St., Chicago, Ill. Second. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Popular Mechanics Company, 200 East Ontario St., Chicago, Ill. L. B. Windsor, 200 East Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Third. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. Fourth. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. Willis S. Brown, Business Manager. Sworn to and subscribed before me this 25th day of September, 1934. J. GRAHAM, Notary Public. (My commission expires June 30, 1936.)

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On my Plymouth 6 I obtained an average of 22 miles per gallon, an increase of 7 miles. This means a saving of $15 a month or $180 a year. — F. S. Peck, Calif.

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9″ x 3′ Std. Change Gear Lathe	235.00	50.00	17.00	12	284.00	60.00	19.50	12
11″ x 4′ Std. Change Gear Lathe	300.00	60.00	19.50	12	393.00	80.00	26.00	13
13″ x 5′ Std. Change Gear Lathe	352.00	75.00	25.00	13	485.00	100.00	29.00	14
15″ x 6′ Std. Change Gear Lathe	430.00	90.00	26.00	14	570.00	115.00	33.50	15
16″ x 6′ Std. Change Gear Lathe	480.00	100.00	29.00	14	622.00	125.00	34.00	16
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